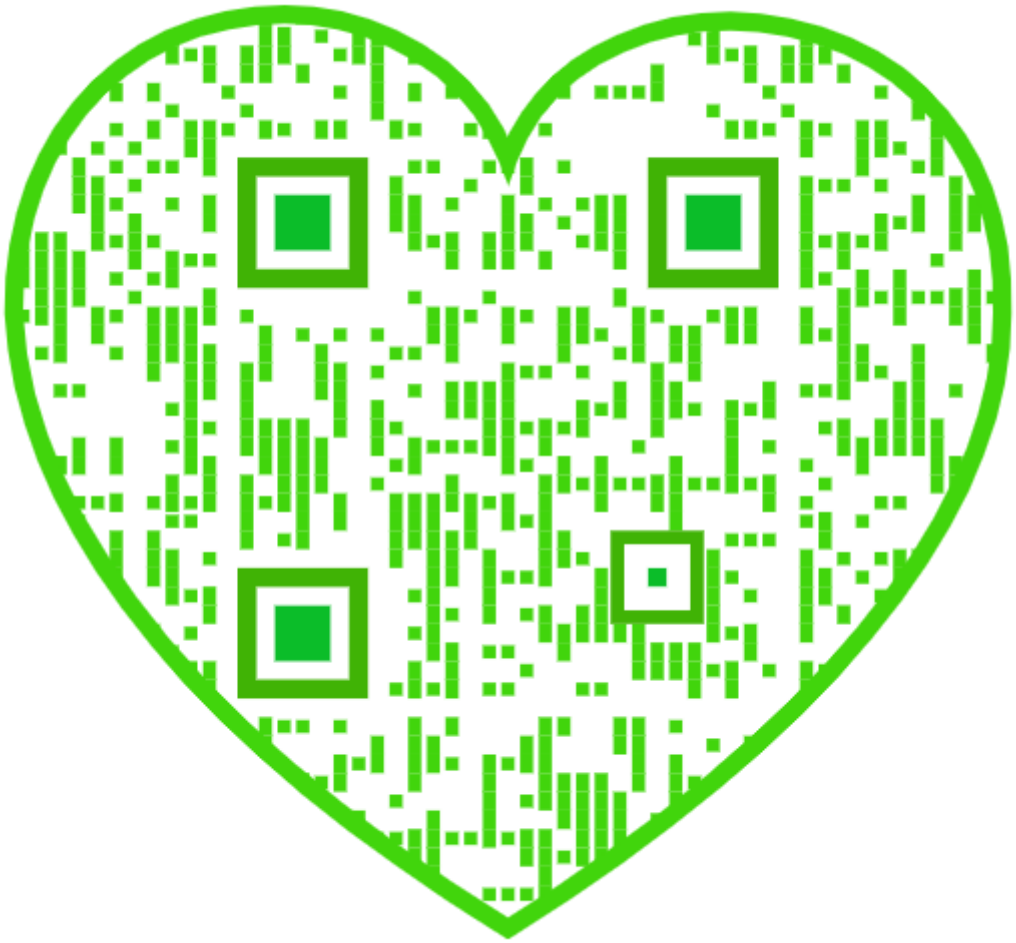

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# SPECTACLES:

THEIR

# USES AND ABUSES

IN

# LONG AND SHORT SIGHTEDNESS;

AND THE

## PATHOLOGICAL CONDITIONS

RESULTING FROM THEIR IRRATIONAL EMPLOYMENT.

BY J. SICHEL, M.D.,

OF THE FACULTIES OF BERLIN AND PARIS; CLINICAL PROFESSOR OF DISEASES OF THE EYE; OFFICER OF THE LEGION OF HONOR, ETC. ETC. ETC.

TRANSLATED FROM THE FRENCH, BY PERMISSION OF THE AUTHOR,

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BOSTON:

PHILLIPS, SAMPSON, AND COMPANY,

110 WASHINGTON STREET.

1850.

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# PREFACE.

The publication of these Clinical Lessons on Spectacles, and the pathological conditions consecutive to their irrational use, was commenced in 1845, in the *Annales d'Oculistique*, at Brussels.

The present work contains many new and very important considerations, and a description of several frequent and grave maladies, of which no one had previously spoken; such as *presbytic amblyopia*, *congenital presbytic amblyopia*, *amblyopia produced by the use of too powerful glasses*, *muscæ volitantes caused by the abuse of spectacles*, etc. These affections may be prevented, arrested in their development, or completely cured, by the use of properly selected spectacles. For these reasons I may recommend the perusal of these pages, not only to physicians, but also to opticians. The latter have it in their power, yet more than the former, to diminish the number of these maladies by judicious advice, or to augment it by the unseasonable concession of too powerful glasses. Unfortunately, they very generally continue the habit of commencing by too powerful numbers in the selection of spectacles, although this practice is entirely contrary to their own interests. I beg them to read and reflect on what I have said on this point, particularly in §§ XI. and XXX.

Sichel, D. M.

*Paris*, 1848.

# TRANSLATOR'S PREFACE.

The catalogue of our Medical literature contains no work on the important subjects discussed in this treatise — Ocular Hygiene — and the large class of diseases, in the production or amelioration of which spectacles exert an important influence. I have, therefore, great satisfaction in availing myself of the kind permission of its distinguished author, and publishing in this country a translation of a work emanating from the highest authority in this department of medical science.

The question of the appropriate uses and the disadvantages of spectacles, is one, which, in the absence of all authority, has been little understood by many practitioners who have occasion to give advice respecting their adoption; it is, therefore, with a full conviction that this monograph will be generally welcomed, and will prove a guide of the highest utility, that its valuable pages, the results of mature observation, cultivated intellect, and wide experience, are offered to the Profession in America.

The author has stated his intention of publishing "Lessons upon the Inequality of Focus of the two Eyes, and upon Cataract Glasses," at some future time; but the present work is perfectly complete and independent, including everything relating to long and short sightedness, and all those considerations which are of most general importance to the physician, to opticians, or to those devoted to literary pursuits.

On the appearance of this second work, I hope to have the pleasure of publishing a translation.

H. W. W.

10 *Essex Street*,
*Boston, Mass.*, 1850.

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# SPECTACLES.

## PART I.

### § I. COMPASS OF VISION.

EVERY one knows that the compass of vision is different in different individuals ; but it is only the extremes which have received a particular designation: *presbyopia*, or long-sightedness, from πρέσβυς, *old person*, because the reach of vision tends to increase with age; and *myopia*, from μύειν, to wink, on account of the instinctive movement of contracting the opening of the eyelids made by those persons in whom the focus of vision is at a very short distance, in order to admit only the rays nearest to the visual axis, and to exclude the peripheric rays, which, too strongly refracted by the media of the myopic eye, unite in front of the retina, and produce only a confused image.

The differences comprised between these two extremes are so numerous that it is difficult to determine a precise standard of normal vision. This difficulty results from the insensible transition between long and short sightedness.

## § II. FACULTY OF ACCOMMODATION OF THE SIGHT TO DIFFERENT DISTANCES.

We have said that the point of normal vision cannot be established with precision, because it varies infinitely in different individuals. Even for each person this point is not fixed, but is without exactly circumscribed limits. By an experiment easily made, we may convince ourselves that the same object is visible to us with equal clearness at various distances, often widely differing. If we place, for instance, printed characters of ordinary size at the shortest distance at which we can see them with perfect distinctness, and then remove them by insensible gradations from one to several inches, we can still continue to read them with facility. It is the same for larger objects, which we can remove several feet without ceasing to perceive all their details. Certainly, the extent of the space which may be passed over by the object without the loss of a clear perception of it, will vary very much in a given number of persons enjoying normal vision, but few will be found in whom visual perception will not remain clear in an extent of several inches for bodies of small dimensions, and of several feet for those more voluminous. The less any individual, by the nature of his occupations, has been forced to maintain himself always at the same distance from the object he observes, — the more he has been accustomed to fix his eyes alternately on near and distant objects, — the more the extreme limits of his sight will be extended. Those who shall have

most varied these distances, will preserve the greatest extent between the positions in which they can perceive objects; for such it will sometimes be difficult, according to the views generally entertained upon presbyopia and myopia, to determine in which of these varieties their sight should be placed; for, like the myopic, they read at a very short distance, and, at the same time, they are very far-sighted, like the presbyopic. This simple consideration suffices to prove the great latitude which the extent of vision may possess; the numerous and insensible shades by which presbyopia and myopia approximate towards each other, and the power possessed by the eye of adapting itself to different distances. This power is now generally admitted, and proofs of its existence are furnished by physiology, comparative physiology and anatomy, and pathology. Those furnished by the latter, the least studied, and in part completely ignored, appear to us the most important; it is those which we shall principally consider in these lessons, which are to be altogether practical. If certain eminent physiologists have denied the existence of this faculty, it is probably on account of their ignorance of these practical facts, and also, in part, because they have themselves possessed this power of accommodation in only a limited degree, or have lost it by want of exercise, or by working too assiduously upon small objects at limited distances, or by occupying themselves too much in microscopic researches. According to the laws of optics, this power of accom-

modation of the eye to different distances ought to exist; without it we should not clearly perceive objects of the same dimensions, except when placed at the same distances. It is probably executed by the aid of interior changes in different parts of the globe of the eye. The axes of this organ can probably extend or shorten themselves; its constituent parts, as the cornea, the crystalline, the vitreous humor, the retina, &c., can probably approach one another, or change their dimensions or curvature.

The changes of the diameters of the pupil, the inequality of convexity of the two faces of the crystalline, its lamellar structure, the increase of its density from without inward, and, finally, a crowd of other circumstances, concur to produce this marvellous power, unpossessed by any optical instrument. The action of the muscles of the eye exerts a considerable and, perhaps, a principal influence, as has anew been proved, of late years, by ocular myotomy, after which the focus of vision sometimes changes to a notable degree. Also, when the gaze is suddenly changed from a near object, especially if it is of small dimensions, to a distant one, with an effort to distinguish it as clearly as possible, a painful sensation in the eye is immediately perceived. Sometimes even, after having regarded small objects a long while, as in observations with the microscope, the power of distinguishing distant objects is lost during some instants. These two circumstances, with the easy experiment before mentioned, form two arguments,

*ad hominem*, capable of producing a first degree of conviction in those who have not given special attention to this subject. If we reflect, also, on the prodigious extent of vision of birds of prey, who, from an immense height, recognize a small animal moving upon the soil, and, descending upon him with the quickness of lightning, seize him in a single instant with astonishing accuracy; if we consider, also, the special organ, the ciliary processes, which, from its structure and its insertions, can but be destined to bring the crystalline and the corpus ciliare nearer to the retina, we shall be most firmly convinced of the faculty of adjustment of the eye to different distances. It is impossible to occupy ourselves here with the proofs of the existence, and the physical and anatomical explanations of this power, for which we must refer to works on optics and physiology. The second order of proofs, drawn from the pathology of the eye, is alone to be considered in these lessons. These also refute, in our opinion, the theory of the late Treviranus, who, by a detailed mathematical demonstration, believed that he had proved the structure of the crystalline, composed of concentric lamellæ increasing in density from the exterior to the centre, to be sufficient to explain the distinctness of vision at so many various distances.

In taking the faculty of accommodation as a starting point, we hope to demonstrate that its notable diminution, or complete loss, is the cause of presbyopia and myopia, and of the maladies

which follow the ill-judged use, and the abuse, of spectacles;— we hope, also, to throw some new light upon this interesting point of physiology.

## § III. GENERAL CAUSES DETERMINING THE COMPASS OF VISION.

The sight of man, in a natural state, has generally a somewhat extended range; we might even say, that the greater number are born with long sight, and that, in his primitive condition, man is presbyopic.

All travellers cite more or less astonishing instances of the extent of the power of this faculty in most savage tribes; some even deny their capability of discerning small objects placed near them, — but there is much exaggeration in this assertion, and, in those to whom it is applicable, it depends on a want of attention, or a defect of intelligence, rather than upon an impotence of the eye to exercise this faculty of accommodation, or upon any particular imperfection of the organ of vision. For others, the difficulty of discerning small objects when brought near, results from the habit of always observing larger and more distant objects, which is followed by a loss of the faculty of accommodation to short distances and small dimensions.

Among civilized nations, primitive long-sightedness is also the general rule; and when particular tastes, as that for hunting, for travelling, especially by sea voyages, solicit the frequent

employment of this sense, it soon acquires a very great power. Among those who reside in the country and devote themselves to agricultural employments, short-sightedness is rare. When, on the other hand, by inclination or necessity, the sight is assiduously, and from early life, exercised upon small and near objects, as is almost always the case in our state of civilization, the sight, forced to accommodate itself to these distances, becomes, very early, shortened. Even before the infant can walk, objects are given him for play-things which he is obliged to bring near his eyes in order to see all their details. A few years later, he is placed at school: there, sometimes to distinguish the too small print of his book, sometimes to write in a fine character, he is forced to incline forward towards his paper or his books. Born among the working classes, the child is none the more favored on that account in the education of this sense; as soon as may be, he is placed in apprenticeship, and not only is often constrained to exercise his sight upon minute details of form, but the fatigue of his arms forces him to bring the objects yet nearer to his eyes. Habituated continually to adjust his sight to these limited distances, he finally ends, necessarily, by losing the faculty of accommodation to distant objects, and becomes myopic.

## § IV. GENERAL CONSIDERATIONS UPON PRESBYOPIA AND MYOPIA.

Since it is impossible exactly to determine the normal range of vision, the same difficulty must recur when we attempt to establish the precise limits where presbyopia and myopia commence to manifest themselves. In fact, we find long-sighted persons, whose vision at a distance has an extent double that ordinarily enjoyed by the long-sighted; whilst others can bring small objects within half the distance at which others can see them, who, however, possess nearly the same vision of remote objects. It is the same with the short-sighted, of whom some see much further, or much more near, than others. All the ordinary standards of the range of vision, proposed to serve for defining the limits of long or short sight, are insufficient. The employment of convex or concave glasses forms a better and more sure criterion.

All that can be said, in a general way, of these two varieties of vision, is this: the presbyopic sees distant objects distinctly and without fatigue; he sees much less clearly small and near objects, and his eye easily becomes fatigued when he is forced to fix his attention upon them during a long time. That he may see them well, it is requisite that they should be in a strong light; but if he observes these objects with the aid of moderately powerful convex glasses, he sees them more distinctly, without finding them much mag-

nified, and without being compelled to bring them as near the eyes as a short-sighted person would be forced to do. Aided by these glasses, especially if they are not too powerful, his sight is less fatigued than when it is unassisted. If he observes distant objects through concave glasses, their impression is more or less clouded, smaller, and always less distinct than with the naked eye; these symptoms augmenting in direct proportion to the concavity of the glasses.

The myopic, on the contrary, by the aid of these last-named glasses, sees distant objects better than with the naked eye, and of a natural size. With the naked eye, he sees them indistinctly. They gain in clearness when observed through any diaphragm, as through a tube, through the hand nearly closed, or placed as a shade above the eye-brows, or, better yet, through a small hole pierced in an opaque body, as, for instance, a card. This is the reason that he habitually winks in regarding at a distance; from which circumstance his designation is derived, and not from *mios*, small, and *ops*, vision, (vision of children,) as a compiler has ridiculously stated. The winking has doubtless, moreover, another effect; the contraction of the eye-lids, in compressing the globe of the eye, augments the power of accommodation. Every short-sighted person may easily feel that the simple approximation of the eyelids is not sufficient, when he desires to see much further than ordinarily, but that there takes place in his eye, during the greater or less constriction

of these membranous curtains, something extraordinary, which indicates a change in the habitual relations of the various parts of the organ. Looking at small objects through convex glasses, the myopic finds them considerably magnified. To see them with dimensions nearer their veritable size, he is forced to place them infinitely nearer than the presbyopic would do. These conditions are more marked with an increase of power of the glasses.

Most persons, and many physicians, believe that the range of vision of an individual may be recognized from a certain conformation of the eyes. This opinion is far from being well founded. Often, it is true, we find myopic persons in whom the globe is voluminous and projecting, the anterior chamber large, the iris brown, the pupil very changeable and contracted, etc. The presbyopic have more frequently small eyes, a flattened cornea, a small anterior chamber, a blue iris, and indolent and dilated pupil. But all this is not constant : very often, of two individuals, in whom the conformation of the eyes is absolutely the same, one is long, and the other short, sighted. This is easily explicable by the inequality of curvature which may exist in the external and internal constituents of the organs of vision. The too great convexity of the cornea or sclerotica, and the exuberance of the refractive media, may be compensated, or more than compensated, by the less density of the aqueous humor and the vitreous body ; by a difference in the axes of the globe, and in the action

of its muscles ; by an adjusting power more or less considerable, etc.

Here would naturally place itself the question whether an individual may be at once presbytic and myopic ; but we adjourn for the moment its consideration, its solution requiring certain elements which we have not yet considered.

## § V. SPECTACLES IN GENERAL, AND THE NUMBERS WHICH DENOTE THE POWER OF THE GLASSES.

Beyond the loss of the faculty of accommodation, which may produce myopia and presbytia, the immediate cause of the latter is a too feeble refractive power of the transparent media of the globe of the eye, or a too short antero-posterior diameter of the organ. In these two cases, rays coming from a not distant point, and being, in consequence, too divergent, unite too late, and form their image behind the retina. In order to concentrate them in a normal focus upon the membrane charged with the transmission of the impression to the brain, — collective, that is to say convex, glasses, of exactly sufficient power to supply the deficiency of refractive power in the eye, become necessary. The remote causes of the insufficiency of this power are somewhat numerous : either a too slight curve of the parts constituting the dioptric apparatus ; or the too small quantity of the vitreous or aqueous humors, as well as their thinner consistence ; or again, an

excessive muscular action, are capable of destroying the normal convergence of the rays.

The contrary is true in myopia : the refractive power of the eye is too great, or its antero-posterior axis too long ; as a consequence, the rays coming from distant points, which are very slightly divergent and almost parallel, will be brought to a focus in front of the retina, and, in order to paint their image upon this membrane, they require the aid of concave glasses, of which the dispersive power should be equal to the excess of refraction. The organic conditions of the eye opposite those which produce myopia give rise to presbytia. It is wrong to believe, in one or the other of these cases, that these particular dispositions must betray themselves by manifest and unvarying external signs. On the contrary, it is only by exception that the exterior conformation of the eye, by an excess or a want of convexity of the cornea and of the globe in general, permits us to form an opinion as to its being myopic or presbytic. In most cases, it furnishes no indication in this respect ; the internal parts, by their disposition and structure, alone determining the compass of the sight.

We generally employ bi-convex and bi-concave lenses ; that is, those of which the two surfaces have the same curve ; they are the glasses of greatest power, the most simple of fabrication and of foci most readily calculated, because it is equal to the radius.

Each of the surfaces of these glasses is in fact a

segment of a sphere of greater or less diameter. The shorter the diameter, the greater will be the convexity or the concavity of the glass. The radius of their curve, which announces at the same time the focus where the image will be produced, is employed to indicate their refractive or dispersive power, and thus establish the relations between the different glasses of the same species, and to graduate their use. The radius is calculated in inches of the ancient French measure. The system of *métres* has not yet been adopted, and we do not know that any advantage would result from its application to these computations. If, for instance, we speak of a convex glass, No. 48, it is understood that each of its surfaces forms a segment of a circle of 48 inches radius. If the same number of a concave glass is spoken of, the radius is the same, but we have two segments, concave on one of their faces, and placed with their convexities back to back, thus presenting one concavity towards the eye, and another towards the object. The curvature of the arc of a circle increasing in proportion to the diminution of its radius, it follows that the numbers of glasses, reckoned by their focus, diminish with their power, the lens of the lowest number being the strongest, and *vice versa*. The highest number, which serves as a starting-point, and the manner of successively descending to more powerful glasses, are not everywhere uniformly regulated. At Paris, twelve years since, numbers much too strong were employed by patients when com-

mencing their use. Experience has permitted me to establish that there is much to be gained by commencing with numbers of the most feeble power, and I have introduced the use of glasses which formerly were employed but rarely and almost accidentally, such as the numbers 96, 80 and 72; and have advised that these should be made use of at the outset, especially by the presbytic; as we shall explain in treating of that affection. This custom has been generally accepted at Paris, although at first opticians ridiculed these elevated numbers, because they regarded them as inefficacious, or without any influence.

In France and upon all the continent, the numbers of spectacles are regulated according to this rational principle which we have explained. In England and in America, these numbers are merely conventional. Thus, for instance, the No. 1, corresponds to our No. 48; the No. 2, to No. 36, etc. Beyond the inherent inconveniences of an arbitrary and irrational scale of numbers, this system has also two other very grave faults, viz: that of starting from too powerful a number, as we shall hereafter see; and that of a too rapid progression.

We have said that bi-convex and bi-concave glasses were those generally used. When there exist particular reasons for employing convex-concave, concave-convex, or plano-convex, the focus may be found by calculation, and after having made its reduction, it is to be designated by the number which would be proper to glasses of double curvature and an equivalent power.

## § VI. THE FORM OF SPECTACLE GLASSES AND THEIR FRAMES, THE MANNER OF WEARING THEM, AND SOME OTHER ACCESSORY POINTS.

We shall devote here a few words only to these practical questions, which are treated of *ex professo* in special treatises.

Spectacles are usually manufactured of an oval form and small size, to render them more elegant; but, as regards their utility, it is infinitely preferable that they should be large and round, covering not only the globe of the eye, but also a part of its vicinity. This is especially necessary for colored glasses employed to mitigate the impression of light, in the cases of photophobia, and congestion and chronic inflammation of the internal membranes. The border of such glasses should extend to the margin of the orbit; otherwise, the light, especially that which is reflected from the ground, will strike upon the circumference of the globe, the centre only being protected by the darkened glass; and the impression thus produced is doubly injurious on account of the contrast.

Something similar is true of lenses, when they are oval and too small; refraction takes place only for objects placed in front of the eye, whilst those placed above, below, or laterally, especially during the movements of the organ, present their natural image. A very disagreeable confusion and inequality of vision, and sometimes diplopia, results from this. These effects are more marked

when the glasses are bi-convex or bi-concave; for then their diminished curvature at the circumference causes vision to be less clear than in looking through the centre. To obviate this inconvenience, periscopic glasses, that is to say, in the meniscus form, may be advantageously employed, convex-concave for the presbytic, (with predominance of convexity,) and concave-convex for the myopic, (with predominance of concavity.) As to the glasses of cylindrical surface, I have not yet been able to form a conclusive opinion in regard to them. In general, it has appeared to me that they have no appreciable advantages, and that, if they are to be used, they should be chosen of a number a little more feeble than other glasses.

The frame-work of spectacles should be light and of proper dimensions. If it be too large and broad, their immobility is lost, and the eyes are fatigued by the vacillation of the image; if it be too narrow and heavy, the temples are compressed, pain and a feeling of uneasiness are produced in the parts near the eye, and secondarily in this organ, and the sight is thus affected. The glasses should be neither too near, nor too far from each other; if this consideration is not attended to, diplopia and other anomalies of vision may result.

In wearing spectacles, they should be carefully placed parallel, and not obliquely to the iris; for the oblique incidence of rays impairs the clearness of the image. If brought too near the eye,

they hinder the movements of the lids, or the transparence of the glasses is destroyed by the contact of the cilia, of tears, and of mucus. Equal care should be observed not to remove them too far, and place them more or less low upon the nose, which changes their mode of refraction, and gives them a different power from that which their number indicates. To speak generally, they should be placed as near the eyelids as may be without causing them to come in contact with the cilia. In this respect, the conformation of the nose, of the eyes, and the edge of the orbit, may occasion difficulties, which should be vanquished by the optician, in giving to the frames the particular form which the circumstances require.

Tears, transpiration, the vapor exhaled in the respiration, and that contained in the air, are deposited more or less upon the glasses of spectacles. They should, therefore, be occasionally taken off and carefully wiped with a piece of fine linen, or, what is better, fine wash-leather. When they are laid aside, the surface of the glasses should not be brought in contact with the objects on which they are placed, for, especially if convex, they are easily scratched by the contact of dust, foreign substances, and the inequalities of the surfaces with which they are brought in contact. They should be placed open, on their border; or folded, with the branches placed underneath to protect the glasses. It is yet better to place them, each time they are laid aside, in their

case, of which the cavity should be lined with a soft material, and should have such a form and such dimensions that the glasses should not rub in entering. Before replacing them on the eyes, they should be wiped. If these particulars are neglected, the glasses are scratched, lose their polish, and become opaque in spots or striæ; and these defects, if not early perceived and remedied, alter and enfeeble the sight. The same result ensues if they are used when dim with dust, vapor, the impress of the fingers; or if the glasses were originally imperfect, — being scratched, of uneven surface, or containing bubbles of air, minute foreign substances, or other defects. The purity of the material of the glasses and the polish of their surfaces are essential; they should therefore be very carefully made from the hardest glass, or from crystal.

## § VII. INFLUENCE OF THE FACULTY OF ACCOMMODATION UPON THE PRESERVATION OF A PROPER FOCUS IN THE PRESBYTIC AND MYOPIC.

WHATEVER may be the compass of vision, it is very important that the faculty of accommodation should be assiduously exercised; but not in a manner too constant, or too long continued in the same direction, that is, not always at short or at long distances. It is necessary to exercise the sight alternately upon near and distant objects. The reasons for doing so are easily explained.

In the first place, all exercise of the accommodating power is more or less fatiguing, since it is analogous to muscular action, and perhaps even consists in a kind of contraction of the muscles of the eye, as may be readily perceived in one's own person upon looking fixedly at very near or very distant objects. All excessive and irregular muscular action becomes fatiguing and injurious to the organ. On the other hand, an adjustment too long continued to distances always identical, whether at minimum or maximum, deprives the organ of vision of its power of adaptation to less or more considerable ranges, and may prolong or shorten the focal distance beyond due bounds, and permanently. Let us explain by giving some examples. The exercise of the adjusting power is particularly fatiguing to the presbytic, when he is desirous of employing it beyond its just limits. If, for instance, he reads a fine print, during too long a time or at too short a distance, his sight becomes dim, he no longer discerns clearly. He feels in the eye the sensation of a painful effort. If he persists a long time in this exercise, and repeats it often, his sight will lose its natural range for observing distant objects, or will become enfeebled, as we shall hereafter see. These troublesome effects will be the more marked in the presbytic, for the reason that presbytia augments naturally with age, and therefore allows an adaptation to short distances less readily and in a less extent than myopia. The latter, in fact, diminishing with the progress of years, permits this accommo-

dation, without inconvenience, for distances which more or less surpass the ordinary focus.

These considerations will cause the hygienic rules, which we shall lay down for each of the varieties of vision, to be better understood, at the same time that they will aid to make their importance appreciated.

## PRESBYTIA, OR PRESBYOPIA.

### § VIII. HYGIENIC PRECAUTIONS TO BE OBSERVED BY THE PRESBYTIC.

Since civilized life requires the frequent exercise of the sight at a nearer distance than the focus of the presbyopic will, as a general rule, permit, — in order to avoid the consequences which may follow this neglect of the physiological laws of the sense of vision, those affected with presbytia should follow certain hygienic rules. Whilst reading, writing, or engaged in other occupations requiring minute attention, the objects should be removed to the longest possible distance at which their distinctness shall be unimpaired. This distance may easily be determined by moving the object backwards and forwards, and should always be maintained during assiduous employment. During other less pressing occupations, — those rather of leisure than professional, — they should, on the contrary, exercise their sight at less distances, in order to preserve the faculty of accommodation, and to accustom themselves to see objects within their normal focus. But, during

both these kinds of occupation, they should be careful to interrupt themselves frequently, in order to change their sight to the most distant objects they can perceive. Every presbytic would do well, after five or ten minutes' work upon minute near objects, to raise the eyes and turn them for an instant to the most distant parts of the room, or even, if he be near a window which is not entered by full sunlight, to look out from his apartment and endeavor to distinguish the details of distant objects. This exercise, by alternately lengthening and abridging the range of vision, preserves the faculty of accommodation and the normal focus, at the same time that it prevents the enfeebling of vision. An interruption of a few instants, often repeated, is sufficient to ensure all the salutary effect of this exercise. I have often known all the menacing fatigue felt by the presbytic after long uninterrupted labor, though sometimes already preluding amblyopia, to yield after using this means only. This fatigue is experienced by them whenever they continue their employment during a long time without reposing the eyes. It seems that Taylor had already foreseen the profit to be drawn from so simple a rule. This oculist of the middle of the last century, who, though charlatan, was neither wanting in quick perception nor experience, though his knowledge and skill were far below what has been ascribed to him by his biographers; this ambulatory oculist already knew, and made great account of, the utility of this alternating exercise. I read, some

time since, in a work of Eschenbach, published in German in 1752, and now rare, (a very important work for the just appreciation of this man so little known even by his biographers, and who has usurped so great a celebrity,) that he sold at a very high price a pretended secret for preserving and fortifying the sight, — a secret which consisted only in frequently removing the eyes from near objects to those at a distance. During the more than ten years since observation and reflection have induced me to recommend this prophylactic means, I have often been answered with the objection that it would be troublesome to interrupt so often the course of avocations; but I repeat, that a cessation from them for a half minute, or even a shorter time, is sufficient, — and the habit once fixed, the interruption is no longer even perceived. The better these rules shall be observed, the more the eyes will endure usage, and the later the necessity of wearing spectacles will be felt. In proportion as one is obliged to occupy himself in minute details, will it be important for him to constrain himself to obey them. As a general rule, the presbyopic should not select a profession compelling him to work upon objects of delicacy or small size, which must be brought near the eye, and often examined by the aid of lenses; as those of jeweller or watch-maker. However, it is sometimes difficult to consult the visual focus for the choice of a profession. The love of independence, and the repugnance manifested in the majority of the laboring classes to

accept any position which reduces them to the condition of domestics, often cause a great embarrassment to the physician, when he is asked for advice in regard to the preservation or the restoration of their sight. Thus it is common to see shoemakers, seamstresses, etc., who, to avoid grave maladies of the eye, should be domestics or chamber-maids, — conditions which they abhor. They must then continue to work upon minute objects. There are also certain acquirements, necessitated by civilization, such as writing, drawing, reading, which cannot be attained without an exercise of the sight in a nearer focus than that normal to the presbytic. It will be fortunate if the bad methods of education of the child do not supervene to cause him to reduce this distance yet further. Visit a school of children who are beginning to write, and a large half of them will be found with the nose nearly upon their paper. In all these cases, the precautions referred to are of the first necessity. It is very important to insist that children keep objects at the greatest possible distance; that they sit erect; and they should be taught to read and write in very large characters, at least during the first years. Those who by occupation are compelled to work upon fine and near objects, as tailors, shoemakers, jewellers, watch-makers, seamstresses, etc., run a great risk, if they neglect the precepts we have given.

The degree of light necessary to the presbytic requires an attentive and particular consideration, as well as the focus.

## § IX. DEGREE OF LIGHT NECESSARY TO THE PRESBYTIC.

The presbytic, as we have already stated, have need of a very bright light to enable them to see distinctly, especially at short distances. Their sight is much less perfect in a mild light. In the evening, at twilight, and by artificial light, they have great difficulty in working. For them especially, sufficient and properly disposed light is of importance. It is very injurious to them to inhabit dark apartments. This is one of the causes which renders presbytic amblyopia so frequent among the *concierges*, or door-keepers of Paris, of whom the majority work as tailors or shoemakers, and who, almost without exception, inhabit narrow rooms called *loges*,* where air and light scarcely penetrate. If the presbytic would have a sufficient artificial light, they should make use of lamps, and not of wax or tallow candles, of which the light is more feeble and flickering, and is diminished as the wick is burned long. In snuffing, it is necessary to look directly at them, which is injurious, especially after having looked for a long time at dimly lighted objects. Many complain, particularly in regard to the Carcel lamps, that they give a violent and hurtful light. This is a great error. The light of a lamp is tranquil, uniform, and intense enough to illumi-

* Small rooms at the side of the arched portal of Parisian houses. — W.

nate the whole of the apartment. It is only necessary to place it in such a way that the rays shall not fall directly upon the eye, — at the left, or behind, — and to place around it a globe of ground glass, or a semi-transparent shade of a bluish or greenish color, and descending low. They enable work to be carried on infinitely better than by the aid of candles, of which the necessary number to furnish the same light would cost far more. These precepts may be universally applied, but especially to the presbyopic, whose vision is promptly enfeebled by any insufficiency of light during their work.

The same is true of colored glasses, of which an abuse has been made, the greater as ophthalmology has been neglected. Even perhaps a distinguished surgeon has no means more efficacious and more generally made use of in ophthalmia and amblyopia, even at an advanced stage, than blue glasses of a paler or deeper tint. These spectacles, wrongly styled *conserves*, are only useful when it is necessary to expose the eyes for a long time to a bright light, or to work upon bodies which vividly reflect the luminous rays, or again in affections more or less complicated with abnormal sensibility to light. In all other cases they are in the highest degree hurtful, by accustoming the eye to an artificial obscurity, and by throwing a blackish tint upon objects, which causes them to confound themselves in one another, and requires an effort to distinguish them with exactness. Thus they give rise to amblyopia, to photophobia,

to myodesopsia, to photopsia, etc.; and augment and maintain these affections when they already exist, as well as ophthalmia and other maladies of the eyes. More than once we have cured amblyopia, photophobia, and chronic retinitis, by gradually abstracting the patient from the use of colored glasses, and from rooms too much darkened, the use of which has also been greatly abused. As to the presbytic, a strong artificial light is essential to them, and colored glasses ought not to be accorded to them except when a pathological condition of the visual organ, or employment upon too brilliant objects, really requires their use. The convex glasses which they employ for reading or work should be colorless, or, in the case of work upon too brilliant and strongly lighted objects, of a very faint grayish blue tint. Colored glasses, and too dark apartments, will do them the greater injury, because they will frequently be compelled to expose themselves to a vivid light in going out of doors.

## § X. USE OF SPECTACLES IN PRESBYTIA.

DESPITE all the precautions which the presbytic may take, his sight is more easily fatigued in working than that of the myopic, especially when he is occupied with small and near objects. This is easily understood; for he is forced, in working, to exercise, almost perpetually, the faculty of accommodation; which cannot be done without fatigue, and which is subject, like all the other

faculties, to lose its force with the advance of years. On the other hand, the compass of vision naturally augments with age, on account of the modification supervening in the refractive media, either by a drying up and flaccidity of the tissues, or by changes in the quantity and quality of the secretions, or by other causes as yet little known. There arrives then an epoch when the sight of the presbytic requires to be aided during work, while at the same time the excess of his visual focus, and the diminution of his adjusting power, are compensated according to the laws of optics. This he may obtain in recurring to convex spectacles.

It is ordinarily towards the age of forty, — that age when the critical changes in the constitution of the two sexes begin to operate, — but sometimes sooner or later, that the necessity for the employment of these auxiliaries begins to be felt. The following are the signs by which the presbytic may recognize if such a necessity really exists : his sight has lost none of its vigor or its compass whilst he exercises it upon distant objects ; it has, on the contrary, most frequently gained, in this respect. It is otherwise for near objects, which begin to appear to him dim and obscure. At first, in the evening, or in badly lighted situations, but afterward equally in the day, however brilliant, the light appears to him insufficient for his occupations. The objects on which he works, printed and written characters, seem to him dark, indistinct, and begin to be confounded one with anoth-

er, or even, if they are very small, seem entirely to disappear, at least momentarily. He brings them nearer, and sees them yet less clearly. It is only in putting them at a greater and often an exaggerated distance, and bringing them near the light, or increasing its intensity, that he is able to give them, during a limited time only, their ordinary distinctness. After observing them for a short time, he again feels fatigue ; if he persists, this fatigue augments, or becomes a pain, which extends from the eyes to the head. In the commencement, these effects are only transiently felt, and after long continued exertion ; soon he experiences them almost constantly, and from the commencement of his work. Arrived at this point, his state is not far removed from presbytic amblyopia, and almost constitutes the first degree of this affection. The symptoms should not be allowed to advance so far before resorting to spectacles, especially when the age of forty has been reached or surpassed. Convex glasses should be employed as soon as the first of these signs manifest themselves and refuse to yield after some time of suspension of the usual employment and when the objects are placed far from the eye. At first, spectacles should only be employed in artificial light, or, in the day-time, for the most assiduous occupations. He should continue to follow the general precepts, and especially that of keeping objects at the furthest possible distance ; less removed, however, whilst using spectacles than while working with the naked eye.

It is impossible to fix, in any general manner, the No. of glasses which should be employed at the commencement. That depends on the normal range of vision, on the age of the patient, and on other circumstances. To believe that an invariable curvature of lenses should correspond to such and such ages, is but a prejudice. Generally speaking, opticians commence with too powerful numbers, augment too rapidly their refractive force, and select, as corresponding to any given age, a much too powerful number. Ten years since, they nearly always took No. 48 as their starting point, and patients were soon forced to descend to No. 36 and 24. The result was, that it was common to see persons between the age of fifty and sixty years making use of glasses between Nos. 12 and 8, and complaining, as we shall soon explain, that even then they saw but dimly, and that their sight declined from day to day. This practice of the opticians is not to be wondered at, when we find, even at this day, in works widely diffused and highly esteemed, as, for instance, that of Mr. Mackenzie, approximative scales which name No. 36 as corresponding to the age of forty, No. 30 to that of forty-five, and No. 24 for that of fifty, etc. From the result of my observations, I have taken No. 72 as a point of departure; which number, in general, is suitable for those who have not yet begun to use spectacles, and who assume them at an opportune moment, that is, at the age of forty or a little later. Often, however, especially for those below forty,

Nos. 80 and 96 are entirely sufficient during a long time. At first, the opticians of Paris deemed the use of so feeble glasses singular and even ridiculous, regarding them as almost without force, and often employing them simply as conserves. Little by little, they have seen this practice sanctioned by its results. They must even find it for their interest so to do ; for, in advising a feeble number to be taken, which is only gradually augmented, they keep their customers a long time, whereas those who have abruptly descended to the strongest numbers fall into amblyopia, and can no longer derive advantage from spectacles.

The method of beginning by the highest numbers has now been generally adopted, and I see persons every day to whom the opticians have recommended the use of convex glasses of No. 72, and who have been perfectly satisfied with those during several years.

## § XI. MANNER OF CHOOSING SPECTACLES, AND OF PROGRESSIVELY AUGMENTING THEIR POWER.

ALTHOUGH we can point out in a general way the power of the spectacles with which it is advantageous to commence, it is, nevertheless, impossible to say, precisely, *a priori*, to which of these numbers a person should give the preference. Each one should choose his spectacles according to his focus ; and he should thus determine it : beginning, for instance, with No. 72, which is an effectual assistance for most persons of about

the age of forty, he should try to read, write, sew, or do his habitual work, with their aid, placing the objects at a little less distance than that at which he sees them with the naked eye. At this distance these glasses should not magnify, but merely cause the object to be a little more distinct, or restore all its clearness, if it had already begun to appear dim to the naked eye. Any glass which magnifies is a little too strong, and cannot fail soon to enfeeble the sight. The principal use of convex glasses, and the only one which should be sought, is, thus to speak, to sustain the sight, and to hinder its being promptly fatigued. The eye, thus armed, ought to be able to continue work during a considerable time; much longer than when not furnished with these auxiliaries. Every species of glass takes from the organ of vision more or less of its adjusting power, by binding it permanently, as it were, to a determined distance. The stronger the glasses, the more they must cause a loss of this faculty of accommodation. In order that this faculty may not be too much diminished, or entirely lost, it will be requisite to be satisfied with glasses just sufficient to correct the excess of the compass of vision and the deficiency of its force; to augment their refractive power only by very insensible degrees, and to endeavor, from time to time, to dispense with their employment. As the presbytic should from time to time suspend his occupation for an instant to turn his eyes to a distance, even while the naked eye is sufficient for his pur-

poses, so, when he employs spectacles, he ought also to lay them occasionally aside, to observe remote objects. He even ought sometimes to endeavor to read and write, or to pursue other avocations, during a short time, with the naked eye and at a considerable distance. He ought never to employ convex glasses, far less concave, for distant vision. We shall have occasion to return to this proposition with more detail. In artificial light, or in dimly lighted situations, if he cannot suspend his work, he ought to interrupt it more frequently, or sometimes to employ glasses of the number next below that which he usually wears.

The graduation of spectacle glasses should be almost insensible. At the commencement of my practice at Paris, the majority of the opticians commenced with No. 48. Of those who sometimes employed No. 72, the greater portion descended immediately to No. 48, and thence to No. 36 or to No. 24. A few of them only interposed No. 60 between Nos. 72 and 48. The Nos. 66 and 54 were never fabricated. If we recollect that the focus of these optical instruments is measured by the radius of their sphere expressed in inches, and that the convexity of a sphere is by so much less considerable as its radius is long, we shall understand that in the highest numbers there is no bad result to be feared if the radius is at once diminished a foot. No. 96, for instance, has a radius so long (96 inches or 8 feet) that the convexity is scarcely sensible, and appears to most

persons a plane glass, having its faces parallel. There is then nothing to fear in making the succeeding No. 84, (7 feet,) a number which opticians, on account of the yet slightly sensible increase of convexity, and perhaps because of some greater facility of fabrication, usually change into No. 80. From this No. 80 to No. 72, the transition is yet scarcely sensible for the majority of eyes; but, in starting from this last, the difference becomes more and more wide, and, by continuing the scale by entire feet, a kind of stride would exist between the intervals, which must be fatal to the power of accommodation. I have caused glasses to be made of Nos. 66 and 54, and usually advise that each number should be made use of during as many years as possible, with the already stated precautions; and no descent should be made of more than six inches at a time. It is an error to assert that it is absolutely necessary to change them, from time to time. On the contrary, it is best to change them as rarely as possible; and not at all, if a necessity for doing so is not felt. It is only through commencing by too powerful numbers, and neglecting hygienic rules, that the necessity is created for changing soon and often. Every time that the glasses selected become insufficient at the end of a relatively short time, we should attentively examine if the number was not too strong, and if there does not exist a certain degree of veritable amblyopia. In this last case, the suspension of work and the use of spectacles, and a medical treatment, become urgent. From

what has been said, then, the succession of glasses should be Nos. 96, 80, 72, 66, 60, 54, 48. From No. 48 the ordinary descent is to No. 36, which, again, appears to me irrational. In fact, this sudden diminution of twelve inches must be very prejudicial at an epoch when the adapting power has already suffered more from spectacles than in the use of the higher numbers, where, however, I have succeeded in establishing transitions of six inches. When asked why I have not insisted on the fabrication of glasses No. 42, I answer that I have rarely seen persons, who, after having commenced under my direction with Nos. 96, 80, or 72, have had need of a stronger number than No. 48; and, on the other hand, I have never seen those who had commenced with No. 48, able to substitute for it a number more feeble than No. 36. It would be proper, however, to fabricate glasses of No. 42.*

If No. 72 is that which is suited in most cases to persons of forty years of age, we can, however, commence by a more powerful number, such as No. 66, 60, or even 54, if the circumstances alluded to prove the necessity for so doing. Persons of thirty, and particularly those much less aged, who, on account of very great presbyopia, of fatiguing work upon small objects, and especially because of a commencement of amblyopia by presbytia, experience the need of spectacles, should never commence by any number more

* No. 42 is now added to the Scale. — W.

powerful than No. 96, and they should be advised to remain satisfied as long as possible with No. 80, which is rarely sufficient for persons between forty and fifty. I know a person, however, who commenced employing this number, by my advice, at the age of about forty-four, and who uses it to this day with the greatest advantage, although nearly arrived at the age of fifty.

When the presbytic has much exceeded the epoch when he should have assumed spectacles; or when, on the contrary, he employs them too soon, or has chosen them too powerful; pathological conditions of more or less gravity are the result, which we shall make the object of a special examination in the course of these pages.

Usually, when spectacles, convex or concave, have been selected in the manner pointed out, they should be tried a second time for each eye individually, because the focus of the two eyes sometimes differs so notably as to require glasses of a different power. We shall again speak of this important point.

## § XII. SUDDEN DEVELOPMENT OF PRESBYTIA.

Until now, we have considered presbytia merely as depending upon primitive and congenital conditions, and only augmenting more or less rapidly with age. Some cases of sudden development of this affection are described by authors. Though in our own practice we have not yet encountered facts of this nature, and though they are difficult

of explanation, we are far from denying the possibility of their occurrence. However, we may be permitted to express some doubt in regard to the sudden and absolute development of presbyopia, unless it has before existed in a certain degree. All we have seen upon this point compels us to believe that no person, myopic even to a slight degree, has ever suddenly become presbytic ; and that the changes, which have been observed to take place so suddenly, have only consisted in a more or less rapid extension of the compass of vision, already naturally long. In passing in review all the observations of this kind which have come under our notice, and in classing them according to the circumstances which have concurred in the production of their phenomena, we arrive at the following results :

1. There are a great number of moderately presbyopic persons, who regard themselves, during a large part of their lives, as being neither long nor short sighted, because they are not compelled to bring objects near, nor to place them further off than ordinarily. Reading and working little, never writing assiduously, and, by habit, placing objects at a sufficient distance, they are not forced to resort to spectacles. The nature of their occupations or their leisure permits them to go out frequently ; they look often at distant objects : their presbytia goes on increasing ; but its progression is so slow and so uniform that they do not remark it. However, at a more advanced age, (that of fifty, for instance,) this augmentation

becomes more sensible; and it is then that these persons more or less suddenly experience the necessity of removing small objects to a distance, and of employing glasses of considerable power for reading and work. At the same time they perceive that the range of their vision is extended for things at a distance. They then believe themselves suddenly become presbytic, whilst their presbyopia has merely increased more rapidly than ordinarily happens, — a natural consequence of the action of the faculty of accommodation, which they have exercised more at a distance than near.

2. The maladies in which the diameter of the pupil is enlarged, — as the mydriasis depending on the paralysis of the ciliary ganglion, that which is symptomatic of paralysis of the common motor nerve of the eye, and that produced at will by the application to the eye of the juice of certain narcotic plants, as belladonna, hyoscyamus, etc.; — these maladies likewise render the sight much more long. Their invasion being almost always rapid, they may suddenly increase an already existing presbytia, or greatly diminish a myopia, which, however, does not change to presbytia. Although ordinarily affecting only one eye, a mydriasis supervening exceptionally in both eyes at once, in forcing the patient to employ convex glasses, may have imposed, in some cases, for a sudden attack of presbytia, especially when the patient, yet young, and never having felt the necessity of increasing the distance of objects, was

ignorant of the particular character of his vision. This circumstance is very frequent, as much among the enlightened as the working classes; for we daily see persons incapable of replying to the question if they are long or short sighted, and scarcely comprehending the question. The fact that mydriasis lengthens the visual focus, and causes more or less presbyopia, is proved by daily experience, and easily verified by instilling a drop of solution of the extract of belladonna into a healthy eye. It was reserved for a compiler, who substitutes arrogance for the experience which he lacks, to teach us, in a self-styled "complete treatise on the maladies of the eye," that mydriasis produces myopia!

3. Other pathological conditions, more or less sudden in their invasion, may likewise produce a sudden increase of presbyopia, to the degree of hindering patients from reading and writing without spectacles. This increase probably ensues from sanguineous congestion in the eye itself or in the soft tissues of the orbit, or from the development of tumors in this cavity, or from other circumstances, yet unknown, which change the diameters of the globe or diminish the faculty of accommodation. Each time that such modifications of the focus take place in young individuals, particularly in children, who have never given attention to the range of their vision, nothing is more natural than to believe that the sight has suddenly become long, whilst in fact it was previously so, though in a less degree.

4. In young persons, especially children, presbytic amblyopia, as we shall see, (§ XVIII.,) presents itself under a particular form, characterized by its more or less rapid march, and by the impossibility of reading. By the aid of convex glasses, reading becomes possible. Without an attentive analysis of the symptoms, this affection might be taken for a suddenly occurring presbytia. Such is the case observed by Hunter, and reported in abridged form in the third vol. of the *Annales d'Oculistique*, page 86. Will our readers take the trouble to read it once again, and to compare it with that we shall describe in §§ XIII. and XVIII.? We venture to hope that they will there recognize a presbytic amblyopia produced by the precocious exercise of the sight in reading and writing, and cured by the cessation of these exercises and by some general treatment.

5. Cases of congenital amblyopia with presbytia (*vide* § XXIV.) may also simulate suddenly developed presbytia, when too assiduous employment upon minute objects has caused it all at once to increase, and especially when symptoms of ocular congestion are united with it. The facts reported by Mr. Ware (Philosoph. Trans. 1813, vol. iii., page 49) appear to be of this nature, as far as their incomplete narration permits to judge.

6. In commencing amblyopia, also, the presbytic see better by placing objects at a greater distance and by using convex glasses. When the primitive focus of their sight is unknown, this amblyopia may be misconceived and taken for a sudden

invasion of a morbid long-sightedness. When the malady of the retina assumes a regular periodic form, or when it is complicated with catarrhal conjunctivitis, with exacerbation towards evening, it may simulate an intermittent presbyopia.

7. Several of the pathological conditions above named, in presenting themselves simultaneously in the same individual, may take on a peculiar aspect, and resemble so much the more a presbyopia supervening suddenly, as it may be more difficult to analyze the symptoms, and to assign to each pathognomic element the part it has in the production of the complex phenomena.

From all which has preceded, we regard ourselves justified in drawing the following conclusions: presbyopia may augment more or less rapidly, but it is improbable that it is ever suddenly developed: short-sightedness never is abruptly changed to real long-sightedness, although myopia, properly governed, may diminish in a very notable degree with years. We shall return to this point in a future section.

## § XIII. A PARTICULAR SPECIES OF AMBLYOPIA PRODUCED BY PRESBYTIA AND TOO ASSIDUOUS EMPLOYMENT OF THE NAKED EYE.

Though long-sightedness is the state of vision most common among civilized men, it does not follow that this range of the sense is that most convenient to them. The exercise of most professions, the requirements of many trades, compel the

concentration of sight upon minute objects placed near the eyes. But if the individual is long-sighted, unless the organ is strongly constituted and the occupation is not too continuous, vision is soon altered, and the symptoms which then present themselves are so much the more important to study because their similarity to those of commencing amaurosis often gives rise to grave errors of diagnosis and prognosis, and, further, induces a recourse to therapeutical means which tend, by their inefficaciousness, to confirm the error of prognosis. It is especially when persons confined to occupations of this nature neglect the rules we have laid down, and do not assume spectacles at a proper moment, that their sight becomes considerably enfeebled, and a particular variety of amblyopia is developed. For a long series of years, during which we have been accustomed, once a week, to give lectures on spectacles, we have described this affection under the name of *amblyopia by presbytia*, or *presbytic amblyopia*. It has certain very marked characteristics, which distinguish it from all the other species of this malady. The following are its symptoms:

The affection supervenes in consequence of the forced and continued exercise of the power of accommodation, when a presbyope has occupied himself, sometimes for years, sometimes for months only, in assiduous work upon small objects held very near the eye. In the highest degrees of presbytia it supervenes very quickly, and even at a very early age; sometimes in children of from ten

to fifteen, when they have scarcely entered upon one of the trades which dispose to the affection. It develops itself the more promptly in proportion as the sight is long and the work is more assiduous and fatiguing. Its march is generally slow; the symptoms, which are principally manifested towards the close of the day, last at first but a short time, and return at intervals. Thus, in the evening, the patient experiences a fatigue of the eyes, a dimness of vision, as if a veil was passing before him; sometimes also a sensation of uneasiness, which may even amount to pain. Objects momentarily cease to be seen with distinctness. At first, sight is reëstablished when the patient removes objects to a longer distance; after some time he is forced, momentarily, to suspend his work, or to close his eyes, in order to obtain the same result. That which especially characterizes the affection is, that in beginning to work, the patient sees perfectly well, and this dimness of sight, vulgarly termed blur, (*berlue*,) comes on only after a certain lapse of time: the duration of this interval of clear sight is variable; but always shorter as the affection is further advanced. At first, these phenomena present themselves only in the evening or during cloudy days. The amount of dimness is inconsiderable, and is only experienced after long continued employment, as late in the afternoon. If the affection persists, these accesses commence toward noon, and are more frequently repeated; then they supervene after a few hours, or even an hour of

work; and finally they come on yet earlier, and last longer and longer: they commence in the morning, after a few minutes' occupation, and the patient is at length obliged to suspend work at each moment, and can only read a few lines or words at a time. It is characteristic that, even then, the patient sees clearly when he commences work; except in the evening or in obscure situations, when he experiences a certain difficulty in seeing. It is also a characteristic that convex glasses, of greater or less strength, obviate these troubles, giving clearness and force to the sight, and allowing occupations to be continuously followed. If the patient does not resort to spectacles, his visual troubles increase and force him entirely to suspend his employments, a short interruption being no longer sufficient to reëstablish vision. If he does not relinquish work, the feebleness of his sight augments, becomes permanent, and ends by transforming itself into an amaurosis, which, like the amblyopia which has preceded it, unless complications of which we shall soon speak should exist, has the character of asthenic amaurosis, and suffers special modifications by the use of spectacles, as we shall hereafter explain.

This species of amblyopia is often seen among tailors, shoemakers, miniature painters, engravers, printers, watchmakers, jewellers, clerks, men of letters, seamstresses, etc. In all the numerous classes of persons who work upon small objects, it is so frequent that I have sometimes found at my

*clinique* three cases of this malady among fifteen to twenty patients. To explain this extreme frequency, it will be sufficient to reflect upon what we have said in regard to the causes of this affection, and to consider that all the above named occupations require that the arm should be flexed whilst pursuing them; whereas the majority of presbyopes can only see distinctly and without fatigue at nearly the length of their extended arm. This affection is often developed when individuals, who have been habituated to exercise their naturally long sight on distant objects, suddenly change their occupation and work upon small and near objects. It is thus that it often affects children brought up in the country and accustomed to agricultural work and to an unrestrained life, when they are sent to school or placed as apprentices. Very long-sighted, as a consequence of their antecedent habits, they are compelled henceforth to fix their attention assiduously and almost exclusively upon small objects placed very near the eyes. Forced to exercise their adjusting power in a way directly contrary to that which is natural and habitual to them, they soon enfeeble this power, and at the same time the visual faculty. They thus contract a presbytic amblyopia, which, sooner or later, if neglected, is followed by an acquired myopia or by amaurosis. Presbytic amblyopia becomes especially marked, and is rapidly and fully developed, in individuals who unite a degree of congenital feebleness of the retina to a strong presbyopia, — an affection unhappily very

common, which we shall consider elsewhere, — and which renders them incapable of pursuing any employment requiring assiduous attention, especially upon small objects.

We have never observed anything similar to this species of amblyopia among myopic persons. Every time that an apparently analogous condition has presented itself in individuals who were more or less short-sighted, an attentive examination of the actual condition and of the antecedents has demonstrated to us, that it was not pure and simple myopia, but some other affection which might be confounded with it. Such are, acquired myopia complicated with amblyopia; congenital presbytic amblyopia with appearance of myopia; congenital inequality of the two eyes; myopia increased by the abuse of concave glasses; myopia which is the complication or the symptom of a veritable commencing amblyopia, produced by local or general causes; and, finally, myopia symptomatic of other pathological conditions, as, for instance, a certain degree of hydrophthalmia. All these affections will be treated of in special chapters.

Generally speaking, among presbytic individuals, the amblyopia produced by excess of employment is the most frequent; whilst, among the myopic, this malady is much more generally the effect of constitutional causes, such as cerebro-ocular congestions, abdominal plethora, etc. This last circumstance may be conjoined with the fact that myopia is oftenest encountered in individuals who

have a dark colored iris, hair, and complexion; whilst blue eyes and light hair are usually the portion of the presbytic.

§ XIII½. CONSIDERATIONS UPON THE HISTORY AND THE DISPUTED NATURE OF PRESBYTIC AMBLYOPIA.

PRESBYTIC AMBLYOPIA has not been entirely unknown to the authors who have written upon ophthalmology; but they have imperfectly understood it, for the reason that the most important point of its history, — the presbyopia which is constantly its cause, — has entirely escaped their notice. M. Jüngken has mentioned it under the name of *hebetudo visus*, a badly chosen term, since it is but a translation into Latin of the Greek word amblyopia. It is synonymously with this last word, that the ancients, and with them Beer, have employed it.

Although I had censured in M. Jüngken, as early as 1837, (*Traité de l'Ophthalmie*, page 646,) the numerous and useless sub-divisions which he had established of *hebetudo visus*, and which he maintained in the third edition of his work, (1842,) I had not then made a profound study of amblyopia by presbytia, and I was unaware of its cause, the long range of vision. I then believed (*loc. cit.*) that *hebetudo visus* "was but the first degree of amblyopia, where the patient sees perfectly well, but where the sight cannot support any fatigue, and is dimmed if the eyes are used for some time, or

even for a few minutes." Later, struck with the frequent coincidence of this affection with presbytia, I concluded that they were intimately and essentially connected. Reiterated experiments, made with the aid of glasses, soon led me to a positive result. Some years since, this malady was described by M. Pétrequin, (*Annales d'Oculistique*, vol. V., page 250, et vol. VI., page 72,) under the name of "kopiopia or ophthalmokopia;" by M. Bonnet, (*Traité des Sections tendineuses*, etc., page 278 et suiv.,) under that of "disposition to fatigue of the eyes, or ocular lassitude;" finally, by Mr. Mackenzie, (*Annales d'Oculistique*, tom. X., page 97, et 154,) under the denomination of "asthenopia, or enfeebling of the sight." The first and the last of these learned colleagues have so thoroughly considered the history of the malady that I may dispense with treating of it. That which Mr. Adams has described, under the name of "muscular amaurosis," (Fleussu, *Annales d'Oculistique*, tom. IX., page 224, and Adams, *New Operation for the Cure of Amaurosis*, etc., Lond., 1841, a work which I have not yet been able to procure,) seems also in part to resemble presbytic amblyopia. The nature of these clinical lessons does not permit a more detailed comparison of these works with our own.

It will suffice for the present, in order to explain and reconcile as much as possible the apparently great divergence between the descriptions which these gentlemen have given of this affection and that which we have laid down, to

examine attentively the following propositions. The proofs to sustain them may be found on each page of the works above quoted, and in the sections which we have devoted to presbytia.

1. Neither of the colleagues who have written on this subject, has given particular attention to the study of the compass of vision, and the use of spectacles as applied to assist it. As long as the designation of the proper spectacles in different pathological conditions of the organ of vision is abandoned to the good pleasure of opticians, and the practitioner does not familiarize himself by frequent practice with the mode of selecting them, (vide § XV.,) he will mistake the causes and the nature of numerous ocular affections, and especially presbytic amblyopia. Such was the case with myself, as I have just stated, until I learned to handle the glasses as a means of diagnosis and therapeutics. The same is evidently true of the honorable colleagues whom I have named. As a complete proof of this assertion, it will be sufficient to remember that Mr. Mackenzie (*Diseases of the Eye*, second edition, page 855, note 5) yet preserves, as an approximative average, a scale of convex glasses which gives No. 36 as appropriate to patients of about forty years, and No. 24 as proper at an age approaching fifty, whilst our numerous researches have led us to employ, as a general rule, in the same series of years, only from No. 80 to No. 48. M. Bonnet, also, (page 226,) continues to admit in myopia, (following M. Ch. Chevalier,) as a third

series of concave glasses, "frequently employed in this affection," Nos. 9 to 4, which, according to what we shall presently show, ought to be regarded as almost always injurious, and to be proscribed save in some rare exceptions. Mr. Mackenzie also states (*Annales d'Oculistique*, tom. X., page 103,) that "the presbytic can never succeed in clearly distinguishing near objects, except by the aid of convex glasses;" an assertion only true in respect to the extreme degrees of presbyopia. As a consequence of this want of proper researches upon this point of practical optics, all these authors have mistaken the cause which we regard as the essential and exclusive one of the malady, the presbytia.

2. If many characteristics may be found in the descriptions which these authors have given, which would be vainly sought in our own, it is owing to the fact that they have attributed to the malady symptoms which are not essentially connected with it, but which, on the contrary, belong to accidental complications, which we have carefully separated in order to discuss them in another chapter, (§ XIX.)

3. This is also due to the fact of their having confounded, under the same name, several affections of different natures, but difficult to distinguish, unless pains are taken to determine the visual focus of the patient by an attentive examination, and by patient and reiterated experiments made with the aid of spectacles. These affections are presbytic amblyopia and its divers varieties, con-

genital amblyopia with presbytia, acquired myopia with amblyopia, congenital inequality of the eyes, and all those enumerated in the preceding paragraph; affections to which we shall devote as many chapters, and which we shall consider in their greatest simplicity, in order to avoid attributing to them phenomena which are primitively foreign to them.

4. A circumstance which appears singularly surprising, is, that MM. Bonnet and Pétrequin state that they have never encountered kopiopia except in the myopic, and that Mr. Mackenzie accords to the two ranges of vision nearly an equal frequency in cases of this affection, (page 105,) whilst I have observed it among the presbytic only. I have tried to account for these allegations, so directly contrary to the result of my numerous and minute researches, which I have verified, in all slightly doubtful cases, by making experiment and counter-experiment on the same individual, by the aid of spectacles of opposite curvatures. I have attentively examined, to this effect, all the passages in the works quoted which have treated of myopia or presbytia; but I have found the indications furnished by the authors, upon the compass of vision and the concomitant phenomena, to be incomplete and vague. However, I have been able to determine that the observations recorded as having been made upon myopes, were to be ascribed either to acquired myopia, that is to say, presbytia changed into myopia, (§ XXV.,) or to congenital amblyopia with

presbytia simulating myopia, (§ XXIV.,) or, finally, to myopia augmented by the abuse of too strong or prematurely employed concave glasses. It is only in this last case that I have seen ocular lassitude, amblyopia, and even amaurosis, united with myopia. One fact is admitted by all the observers, viz., that the myopic see small objects very clearly when placed near the eye. One of the principal characteristics of their sight, and, thus to speak, the solitary privilege which nature seems to have accorded to them in compensation for the numerous privations which the limited range of their vision imposes upon them, is the facility with which their eyes endure prolonged use at short distances. All the authors cited say, unanimously, that the symptoms of ocular lassitude supervene only during the act of observing objects of small volume near the eye. In looking over the observations recorded by M. Bonnet, (pages 242—248,) which, though defective in several important points, are yet the most complete of those comprised in the before mentioned works, I find, among six cases, one case of positive presbytic amblyopia; two of myopia acquired, or augmented by work upon small objects too near the eyes; two of acquired myopia complicated, one with amblyopia, the other with inequality of visual focus in the two eyes; one, finally, of myopia notably increased by the abuse of concave spectacles. It is seen that we have here a small number of elements, but that they are excessively heterogeneous, and it is impossible to found a solid judgment upon them

when the question is the solution of physiological and pathological problems of the highest importance.

By attentively studying the works of the distinguished physicians whom we have cited, and by comparing them with each other, with the results of their own personal observations, and with the chapters of this volume which are devoted to the different pathological states dependent on presbyopia, our readers, as well as these colleagues themselves, will be convinced that our opinion and our criticism are founded upon a long and conscientious observation of facts, exempted from all prejudice. Physicians already rich in experience have often been astonished, when, either at our *clinique* or in their own practice, we have demonstrated to them the truth of that which we have just advanced, by an easy argument *ad hominem:* a swarm of symptoms, disquieting for the patient, disappearing completely and promptly, sometimes merely from the observation of hygienic rules, sometimes, almost instantaneously, by the use of spectacles, as we shall see in the next paragraph.

## § XIV. TREATMENT OF PRESBYTIC AMBLYOPIA.

When this affection is uncomplicated, its treatment is extremely simple. It is necessary, as far as may be, to interdict employment of the eyes, or at least to abridge its duration. The patient should be directed to exercise his sight as much as

possible upon distant objects, in order to reëstablish the normal focus, which is always more or less altered. The eyes should be allowed frequent intervals of repose, prolonged in proportion to the long existence of the affection: absolute repose will be indispensable only in the more advanced stages of the malady. If the affection is recent, and not yet strongly marked, it will suffice to follow the other precepts of ocular hygiene inculcated for the presbytic. If the patient continues his work, he should interrupt it as frequently as possible, once in every two to ten minutes, according to the degree of the affection. He will place the objects on which he works at as great a distance as he can, and he will sometimes, or constantly if the affection is more advanced, employ convex glasses, selected according to the general rules. These intervals of interruption will be partly occupied in looking at distant objects, partly in bathing the eyes in cold water, to which after a little time may be added one or two table-spoonfuls of brandy to a glass *(un verre.*)* A large, fine, flat sponge is preferable to compresses of linen, for making these fomentations. The patient should endeavor to have sufficient light during his work, but it should not fall directly upon the eyes. The minor degrees of this affection will promptly yield to these means. When it is already ancient and more advanced, they will no longer suffice, and it will be necessary, besides

* A French *verre* contains about ℥ iv. — W.

this suspension of work, to add the local excitants adapted to asthenic amblyopia. These means will be employed in a rational gradation, commencing with the mildest, such as the following liniments :

R. Spirit Rosmarini ʒ i.
Balsam Fioraventi ʒ ss.
Olei. Lavand. ℈ i.

R. Tinct. Camph. ʒ i.
*Balsam Fioraventi ʒ ss.

At a later moment we may employ, according to circumstances, the first of these liniments, adding from three to five grains of Strychnia, or the second with the addition of from ℈ ss to ʒ ss of Aqua Ammoniæ. Yet later, we may follow these, if necessary, by light vesication upon the forehead and temples. The affection will rarely resist these means, on condition that, as soon as an amelioration begins to be manifest, vision shall be exercised in occupations which are not fatiguing, the patient placing objects at a distance, and employing spectacles properly chosen according to the different degrees of the affection, (vide § XI.,) of which the force will be increased if the fatigue returns too quickly. In those rare cases where a complete cure is not obtained, the patient should

* The Balsam of Fioraventi is the product of the distillation of quite a number of resinous and aromatic substances previously macerated for several days in Alcohol : such as Turpentine, Myrrh, Elemi, Cinnamon, Canella, Cloves, Ginger, etc. I have been unable to procure the precise formula of its composition. Its properties are those of an energetic stimulant. — W.

change his profession. (§ VIII.) If a commencement of acquired myopia already exists, the use of spectacles should be adjourned as long as possible. Even when the malady has already become a veritable amaurosis, this treatment triumphs in most cases, some modifications being made in the therapeutic means and in the force of the glasses. These first named means should be employed more energetically, according to the indications which may present themselves. As soon as, aided by repose of the eyes and the exercise of the sight at a distance, they shall have effected an appreciable amelioration, the patients should be advised to employ, several times in the course of a day, and for a few minutes only at a time, spectacles of greater or less power, which will allow them to read, or perform analogous work, without fatigue, and without bringing objects too near the eye; for a too near proximity causes the spectacles to act as magnifying glasses. As the sight improves, it will be necessary to diminish the refractive power of the glasses.

This last precept conducts us to some considerations upon the effect of spectacles upon amaurosis in general; considerations upon which we shall enter after having examined the application which ocular myotomy may have to presbytic amblyopia.

## § XIV½. APPLICATION OF OCULAR MYOTOMY TO PRESBYTIC AMBLYOPIA OR KOPIOPIA.

Since ocular myotomy has attracted the interest of surgeons in so high a degree, this operation has been also applied to the cure of several affections of vision, among which presbytic amblyopia or kopiopia has not occupied the last rank. This operation could only be proposed when a rational non-surgical treatment had been baffled; a treatment which would naturally escape the attention of those who were ignorant of the cause and the veritable nature of this malady, and the influence which the methodical employment of spectacles may exercise upon it. Neither of the authors who have treated of kopiopia or asthenopia have been able, according to their own statement, to obtain a radical and complete cure without operation. Mr. Mackenzie declares that the treatment is uncertain and various, and that the prognosis is in general unfavorable. For our part, on the contrary, we could only wish that the cure of all varieties of amblyopia was as certain and as easy as that of the great majority of cases of presbytic amblyopia. Besides what we have said on this point, the difference of opinions may also be explained by the fact that we have established a distinction between presbytic amblyopia and the cases which do not really belong to it, especially those of congenital presbytic amblyopia, which are essentially different in all respects, and of far more

gravity. It is to this congenital amblyopia, in its most advanced degrees, and to the extreme cases of presbytic amblyopia not otherwise curable, that ocular myotomy ought, in our opinion, to be reserved. Before recurring to it in these last cases, one should be well convinced that there is nothing more to be hoped from any therapeutic means. This reserve appears to me to be demanded by the analysis of the facts recorded, of which the result is, that ocular myotomy generally augments the range of vision. Consequently it appears to be applicable only to myopia and the affections which more or less resemble it, such as acquired myopia and presbytic amblyopia simulating myopia. Among all the reported observations, I find but one, (BONNET, page 296,) of which the subject, although positively affected by presbytic amblyopia, was completely cured by the section of the *obliquus inferior*. I have some fear that in pure and simple presbytic amblyopia, without acquired myopia or congenital amblyopia, ocular myotomy, by augmenting the compass of vision, may sometimes bring about a result contrary to that desired, and increase the ocular lassitude. The solution of this question, and of several others, relative to the power of accommodation and its morbid alterations, is reserved for the future.

We have never yet had occasion to apply the operation in question to presbytic amblyopia, having generally found it preferable, in these circumstances, to cause the patient to exchange his pro-

fession for one which will not be interfered with by the affection ; for it remains doubtful, in the actual state of science, if, in those cases where the treatment we ordinarily employ has failed, ocular myotomy would have a more advantageous result. We think ourselves entitled to this doubt, having observed the failure of several such operations, performed by surgeons, among whom was one of the authors of this method. Far from wishing, however, to depreciate this operation, which we regard, on the contrary, as a veritable and fortunate acquisition to modern surgery, we look only to establishing its limits and its indications, and to prevent the abuses that novelty and vagueness of description easily induce. We are resolved to essay it the first time that we shall have failed in a non-surgical treatment of a case of this species.

It is evident that the section of one or of several of the muscles of the eye must result in changing the mode of accommodation of the sight to different distances. The surgeons who have applied myotomy to the treatment of amblyopia have regarded muscular action, too exclusively, as the sole adjusting agent. It is more than probable (vide § II.) that the mechanism of this function is very complex, and that the contraction of the muscles of the eye constitutes only one of its elements. Even admitting that it is the sole agent, it will remain to be determined what is the share of each muscle in the accomplishment of the phenomenon ; which are the muscles whose isolated or simultaneous action increases or diminishes the

range of vision, and of which, consequently, it would be proper to make the section, either singly, or several at a time, in order to lengthen or diminish the focus of vision.

The exact solution of these questions, and of all those which concern the theory of the power of accommodation, requires many mathematical calculations, of which the results have thus far been contradictory, many experiments upon living animals, which are very difficult of execution and always subject to doubt, and, especially, many observations upon man, made with an exact minuteness which I regret not to find in those hitherto recorded; for they do not inform us if the individuals operated on have been presbytic, or amblyopic from birth, or myopic, or affected with acquired myopia, or having at the same time a complication of veritable amblyopia produced by other local or general causes. It is not thus that one may arrive at a decision as to which muscles should be cut in these different affections and for each particular range of sight. Hitherto, sometimes one or several of the recti, sometimes one or both the oblique muscles have been cut, and with very nearly the same result; which is not surprising, as the pathological states to be modified by the operation have not been sufficiently discriminated. The section of the inferior oblique is, however, that which appears to unite a generally satisfactory result to a less difficulty of execution and a greater harmlessness. It remains to be determined, for each of these modes of opera-

tion, if the patient may not be sooner or later deprived of the beneficial result, either by the production of an intermediate tendinous substance, which often subsequently contracts and shortens, or by the reinsertion of the cut extremity of the muscle too near its primitive attachment. These conclusions appear to me justified by the cases of relapse which I have observed after operation upon the kopiopic, and by the result of the operations for strabismus which I have myself practised. In the latter, the augmentation of the range of vision has been rare and inconsiderable ; sometimes it has remained stationary; sometimes it has little by little diminished, notwithstanding the complete and radical cure of the strabismus. Some other circumstances have also concurred to withhold me from applying myotomy to the treatment of kopiopia. In examining all the cases in which the authors of this method have given details, I have found that the age of their patients varied from seven to thirty-four years, a period during which we can almost always hope to obtain a cure by the patient employment of the treatment I have laid down. A second circumstance is, that, in the majority of cases, strabismus has been coëxistent ; a complication in which myotomy is always indicated when success has not followed the treatment we shall designate in the chapter devoted to the inequality in the compass of the two eyes.

## § XV. EMPLOYMENT OF SPECTACLES IN AMAUROSIS.

It is without doubt presbytic amblyopia, and especially its higher degrees, to which is due the resort to spectacles as a remedy for amaurosis; a means at first empirically employed by charlatans, who have made a pernicious abuse of it. A few years since, an itinerant optician caused some sensation by pretending to cure all diseases of vision by the aid of convex glasses, generally very powerful, and fabricated by himself, to which he ascribed special qualities. Believing him, at first, well instructed and of integrity, I carefully observed his practice, and several times sent patients to him; but I soon perceived that his assurance was merely an impudent charlatanism, that his spectacles had no peculiarities, and that his cures, due rather to hazard, had occurred more particularly in the cases where presbyopia was in question, and were no more frequent than those which I had been accustomed to obtain by the rational use of convex glasses. Often, on the other hand, I saw deplorable and irreparable consequences result from the prolonged use of excessively powerful numbers, counselled by this optician, and afterward by a charlatan provided with a diploma, who seized upon his method. M. Cunier (*Ann. d'Oc.*, vol. VII., page 87) afterward successfully adopted this manner of employing convex glasses as curative of amaurosis, though he used them in very different forms of the malady

and without previous researches in regard to the range of vision. He appears to explain their action by the excitement they produce upon the retina, of which they reäwaken the sensibility by concentrating on it pencils of rays. This circumstance may certainly concur in producing advantageous results in asthenia of the organ of vision ; but it cannot, by itself alone, explain all the favorable changes produced by convex glasses. If it were thus, their use should also be of service in myopia ; but experience proves the contrary. In my judgment, this method is only really applicable to amblyopia and amaurosis when they are the sequel of presbytia, or, at least, exist in presbytic persons ; and it then requires special modifications to render it really useful, especially that of not commencing by too powerful glasses as long as the patient can read with those of less force. For a long time, acting on the principles I have stated, I have paid attention to the primitive focus of vision in my treatment of amblyopia and amaurosis, and employed spectacles as auxiliary therapeutic means. From an early period I was convinced that this question had been too little studied, as much in regard to its hygiene as its therapeutics, and that it has been too thoughtlessly and too generally abandoned to the often arbitrary judgment of opticians. During about ten years, I have devoted one day, (Friday,) each week, at my *clinique*, to the study of the affections in which the means of artificial refraction play a part in regard to diagnosis or therapeutics, and

have made the necessary experiments for determining the compass of vision and the nature of the maladies which, under certain circumstances, derive their origin thence, in the presence of my auditors.

MM. J. Ansiaux, Beger, Bouchacourt, Cunier, Hairion, Lee, Lenoir, Pétrequin, Pirogoff, Sperino, and a great number of distinguished physicians and surgeons of France and other countries, who have attended my clinical lessons, can attest what attention I have bestowed, for a long time past, on this important and too much neglected point. I have avoided imitating those surgeons, who, ridiculous opposers of everything like a speciality, and nevertheless exclusively bounded within the circle of mechanical and *operative* surgery, would think themselves lowered by an attention to studies apparently so foreign to the healing art. In affections of the retina, I was long since struck by the observation of the modifications which the differences in the compass of vision impress upon the symptoms. Thus, in the amblyopia of the presbytic, small objects are at first better seen by placing them more or less further off; vision remains good at a distance, even when already considerably enfeebled for reading, writing, and every species of work upon small near objects: in these cases, the sight is greatly assisted and improved by the use of convex glasses. It is only with the progress of the malady that it becomes considerably shortened; often when this result arrives, patients believe

themselves to have become short-sighted, but they yet see better with convex glasses. At a more advanced period, spectacles no longer produce a very advantageous effect, and, finally, whatever may be their force, they are no longer any assistance. Amaurosis then becomes complete, and often incurable. In the myopic, on the contrary, the sight, in becoming enfeebled, early commences to become yet shorter. For such persons convex glasses do not facilitate the perception of bodies of small dimensions, except when they are placed very near the eyes ; thus they act only as palliatives, as magnifying glasses to increase the apparent volume of bodies, at the same time stimulating the retina by concentrated light. For this reason, every patient afflicted with amblyopia or incomplete amaurosis, sees better with convex glasses in the first periods of his malady, but the objects must be placed at a short distance : if myopic, the use of these agents may become hurtful to him, by over-exciting the nervous membrane by a too vivid light, and by the exhaustion produced by work in the already enfeebled organ. These facts, which every one can daily verify, soon led me to believe that in amaurosis in presbytic persons the use of spectacles must be useful ; and the more, since the causes of the affection are more local, — that is to say, it is produced only by fatigue of the organ of vision. Thus I was able, little by little, to settle for my own mind the diagnosis and rational treatment of amblyopia by presbytia, and I have not found reason to make

any important alterations of this treatment, after having known the practice followed first by the optician already named, and later by M. Cunier. I have rarely had occasion, in fact, to recur to very strong spectacles; it is only in far advanced presbytic amblyopia, or that passed even to the degree of amaurosis,—in extreme presbyopia, and in the case of inequality of focus of the two eyes, that it may be useful to commence with the most powerful glasses and to descend to the feeblest, when the patient, forced to work, has not time to follow an inverse progression, or when this last has failed. That which to me appears the most rational and the most useful, consists in commencing by an entire cessation from labor, in exercising the eyes on distant objects to reëstablish the normal focus, and, finally, in employing the feeblest possible spectacles, still taking care to place objects far from the eyes.

When it is thought necessary to recur to powerful glasses, experience has proved to me that several of the principal precepts given by the itinerant optician who cried them up, should be rejected as erroneous and mischievous. Thus, he ordered that his patients should wear very convex glasses, and read assiduously, even to ten hours a day. The victims to these fatal counsels have been numerous. In order to be sure to do no injury to his visual faculty, which is already greatly compromised, the amblyopic, amaurotic, or excessively presbytic patient, should select, among the high numbers, the highest number

with which he still sees clearly and without fatigue, holding the book, which should be of large print, at a moderate distance. Once every five or ten minutes he will suspend his reading: in the intervals, he will take off his spectacles and look at distant things. He will read a few hours only each day, and will employ his unaided vision very often upon distant objects. He ought never, during or after his reading, to feel fatigue, or even an approach to fatigue, of the eyes. All the local and general means rationally indicated will also be associated with the use of spectacles, which, employed alone, are not usually sufficient. I regard convex glasses as absolutely injurious to the myopic. Among those affected with amblyopia which I have cured or seen cured by their aid, I have only encountered the presbytic; I doubt exceedingly if authentic proof can be furnished of a single cure of a myope by this method. I shall return to this point in speaking of the employment of concave glasses in amblyopia of the myopic.

## § XVI. VARIETIES OF PRESBYTIC AMBLYOPIA.

PRESBYTIC AMBLYOPIA has often presented itself to us under particular forms, enveloped in great obscurity, but which always acknowledged as their principal cause the greater or less diminution of the accommodative power. However isolated our own observations, no other author has reported similar ones; and however incomplete our knowledge of these affections must conse-

quently be, we shall, nevertheless, endeavor to delineate them. We shall hope that further researches will throw more light on a subject of so high practical importance.

## § XVII. A VARIETY OF PRESBYTIC AMBLYOPIA, IN WHICH THE PATIENT SEES NO BETTER WITH SPECTACLES THAN WITH THE NAKED EYE.

In the circumstances which ordinarily give rise to presbytic amblyopia, we sometimes encounter persons affected with an analogous visual disturbance, which, however, differs in an essential point. Without ceasing to see distant objects with ordinary clearness, they can neither read, write, nor work, without difficulty and fatigue; after a certain duration of the malady, they are even forced entirely to renounce these occupations. In spite of the primitively long focus of their vision, they find no solace in the use of convex glasses, with which they see no better, and even worse, than with the naked eye. In seeking the causes of this insufficiency of these glasses, we find that the patients should have had recourse to them long before, and that they have continued to work with the naked eye beyond the limit established by experience as the proper one. The ignorance of hygienic laws, and, among women, coquetry and the fear of growing old, cause many presbytic persons to neglect the fitting moment for the use of the more feeble spectacles. Obliged to exercise continually the faculty of accommoda-

tion, always more or less limited in the presbyopic, they end, after a certain time, by enfeebling or losing this faculty, and by altering their natural visual focus. Their sight becomes shorter, is dimmer and more easily fatigued, and no longer suffices for minute work, and, at the same time, can no longer adapt itself to the focal distance of spectacles, which are no succor to them.

The treatment of this variety does not essentially differ from that of presbytic amblyopia, except that the repose of the eyes and the exercise of the sight at long distances ought to be continued much longer before recurring to spectacles, in order to remove the state of forced and permanent accommodation to which the patient has subjected his eyes during his occupations. He will employ one of the topical applications advised for presbytic amblyopia. After some time of this exercise and the employment of these means, he will accustom himself, little by little, to the use of very feeble convex glasses, such as No. 96; and in using them he ought still to place objects at a distance. It is often impossible to accustom him to spectacles proportioned to his age and the primitive focus of his eyes, and we are then forced to accord to him numbers which are much more powerful. The difficulty of employing convex glasses before the cure is accomplished, generally arises from the fact that the patient, having already worked too long without spectacles, and at a shorter focus than is natural to him, already begins to contract an acquired myopia, an affec-

tion of which we shall hereafter speak, and the consideration of which will throw light on the variety of presbytic amblyopia which we are now sketching. We may add, that this may become veritable acquired myopia when it has continued a long time without treatment. When it is already accompanied by a commencement of this, there is no difficulty in explaining it. It is otherwise when the distinctness of the sight of distant objects has not yet suffered any diminution, — a case of which the actual amount of our information upon the power of accommodation does not yet afford us a satisfactory explanation; — for if the constant accommodation to short distances during work results in confining the visual range to these distances, and hinders it from adjusting itself to the focus of spectacles, why should it not at the same time limit the faculty of adaptation to distant and voluminous bodies? We submit this problem to the meditations of physiologists, bounding ourselves to a guarantee of the exactitude of the facts observed.

## § XVIII. TWO VARIETIES OF PRESBYTIC AMBLYOPIA WHICH RAPIDLY INCREASE.

1. According to what has been said, presbytic amblyopia has ordinarily a more or less slow march. There exist, however, some varieties, which, it is true, I have but rarely observed, and which differ but little one from another, in which

the symptoms develop themselves rapidly and sometimes even suddenly.

In adults, after fatiguing and prolonged work upon small near objects, the sight sometimes changes so totally, and in so little time, on account of the continuousness and intensity of the exercise of the accommodative faculty, which is more limited, as we have said, in the presbytic, that the patients cease to be able to work without convex glasses. They at first suppose their sight to be entirely lost, and are surprised at recovering it by the use of spectacles, which must generally be very strong to render them this service. Usually they distinguish distant objects with customary clearness; but an attentive examination often proves that the compass of their vision has, even in this respect, diminished. A short time since, I saw a Polish exile, who, having embraced the trade of printer, and having worked diligently at composition, suddenly experienced an enfeebling of sight, which put it out of his power to read any type at any distance whatever. With convex glasses No. 15, he could, however, read tolerably well. I cannot yet perfectly explain to myself facts of this nature, which I offer to the attention of physicians and opticians; they are very rare, whilst presbytia transformed into myopia, with or without amblyopia, is, as we shall soon see, much more frequent, and easy to explain. The treatment to be recommended is nearly the same here as in ordinary presbytic amblyopia. Repose of the eyes in respect to work, exercise of the sight

on distant objects, to reëstablish the lost power of accommodation, cold fomentations, spirituous and stimulating washes, exciting vapors directed upon the eye, etc., are the means which should be advised. It would be dangerous to allow to patients glasses as powerful as their sight requires when this affection is completely developed. Following the course marked out, and only allowing them the use of appropriate spectacles after a suspension of work more or less prolonged, and after a methodical and long continued exercise of sight on distant objects, it is probable that in most cases they may be brought to a condition to resume their habitual pursuits with the aid of much feebler convex glasses.

2. The above paragraph was written, when we encountered a case of this species which merits to be reported.

The 20th December, 1844, a manufacturer of India rubber cloth, aged 50 years, presented himself at the *clinique;* who, three years since, after having occupied himself in reading for three days in a dimly lighted room, suddenly ceased to be able to read. Though he had also lost much of his clearness of vision for his accustomed work, he was not entirely unable to prosecute it, and has continued to do so until this time. He had been treated for amaurosis, by venesections, purgatives, emetics, blisters, etc. Having listened to this recital, I asked if he had made use of spectacles. He had never tried them, neither before nor since the invasion of the malady; no one had

thought of recommending their use. In order to arrive at the diagnosis of the disease one single further question was necessary ; what had been the primitive compass of his sight, and what was the exact alteration it had undergone in this respect. Interrogated on this point, he replied that his sight, formerly very long, had lost a little of its distinctness for remote objects, without his ceasing, however, to distinguish them at a considerable distance.

No more was requisite to warrant the adoption of a diagnosis of amblyopia by presbytia, curable only by the means we have indicated. At the age of forty-seven, when he should already have employed feeble convex glasses for work and reading, he had allowed himself to read assiduously without spectacles, and by a dim light, which is pernicious to the presbyopic. Presbytic amblyopia supervened suddenly, and to so marked a degree that the patient ceased in an instant to be able to read. If, at the invasion of the disease, he had been advised to make use of proper convex glasses, the capability of reading would probably have been immediately restored, and the sole cause of the affection, the presbytia, would have been recognized. This having been overlooked, an energetic and very troublesome treatment had been employed for a long time without success, and during the three years the affection had been able to take profound root, and might be almost regarded as inveterate. I remarked "that the chances of a complete cure will be greater in

proportion as he can read with spectacles of a feeble power. Let us try No. 20; if with that he can read a large print the prognosis will be favorable, notwithstanding the long duration of the affection. It will be yet more favorable if he can read with spectacles of less power. But, after having so long neglected the use of proper glasses, it is probable that he will be forced to employ lenses much stronger than those appropriate to his age, if he had commenced their use at a proper time."

Having first tested the unassisted sight, and found that he was unable to recognize a single letter of about the height of a sixth of an inch, convex glasses of No. 20 were given him, with which he immediately and fluently read the same print. He could also read it easily with No. 48, and could even read, though with some difficulty, one single line of a character only one fourth the size. After this result it would have been sufficient to direct that he should use glasses of No. 48 for reading large print, and of No. 72 or 80 for working; but, in order to secure the best possible result, the following treatment was prescribed.

Entirely to suspend work for a month, or at least for fifteen days. During this time, to exercise the sight upon distant objects, without employing spectacles, or only employing those perfectly plane, lightly tinged with blue, in a vivid light, or when snow covered the ground. Bathing the eyes with cold water, to which has been added

a large spoonful of brandy in four ounces. Furthermore, the patient presenting no symptom of cerebro-ocular congestion, he will use, three times a day, the wash of Spirit Rosmarini, according to the formula previously given.

At the end of the time mentioned he may recommence his habitual pursuits, sometimes with the naked eye, with the objects at a long distance, sometimes with convex glasses of No. 80, the objects being brought a little nearer than when they are not worn. Each five or ten minutes, he will interrupt his work to turn his naked eyes on large distant objects. He should often walk in the open air, and look at remote objects. After having observed these rules during several months, to the end of bringing back his sight to its primitive compass, or nearly so, he may commence reading an ordinary print, during a few minutes several times a day, with the aid of convex glasses of No. 60, 54, or 48. We may regard it as nearly certain, that, if he does not hasten too soon to the employment of spectacles, he will be able to use No. 54 in reading, which corresponds very nearly with his age. This at least is certain, that he was instantaneously relieved from the disquietude into which an error in diagnosis and an irrational and useless treatment had thrown him; and that he can even now, if he desires, read and write with spectacles which most opticians and oculists regard as feeble for his age.

3. A second variety, somewhat similar to the preceding, and requiring the same treatment,

except the use of glasses, may be observed in presbytic children who have been too soon permitted to apply themselves assiduously to reading, writing, sewing, or other minute employments. Here, again, vision is more promptly and more considerably enfeebled than in ordinary presbytic amblyopia, though less than in the variety we have last named; the patients at length can neither read, write, nor work. Notwithstanding this, their sight is in most instances perfect for things at long distances. When we have no information as to the primitive visual focus of such individuals, we are often embarrassed to determine the nature and causes of this variety of amblyopia, which is exempt, like the preceding, from all complication with congestion. It appears to differ from it only by the age of the individuals affected, by its less rapid invasion, on account of the occupations being less assiduous, and by the circumstance that persons so young do not require as powerful spectacles to enable them to exercise their sight upon small near objects. The same means cure them; the complete and long continued suspension of work or study, and persevering exercise of vision upon large distant objects should be particularly insisted on. As long as these are seen with the usual distinctness and without fatigue, the prognosis remains favorable. Some years since, the daughter of one of the national deputies was treated, in concert with Dr. Gaudet, for amblyopia of this description. The affection at first appeared very serious, on account

of the obscurity of its causes, its rapid invasion, and its advanced degree ; but it was completely and radically cured in a few months by the treatment which we have explained. The cure being perfected, it will be necessary to enjoin the rigorous observation of the hygienic rules established for the presbytic.

The instantaneous reëstablishment of the faculty of seeing small and near objects by means of convex glasses, and the persistence of the long range of vision, may cause this variety of presbytic amblyopia, and even that last described, to be taken for a suddenly developed presbyopia, (§ XII., 4th.) This error more readily occurs, because we often do not know the extreme limit of distinct vision in children, since their attention does not ordinarily turn to distant objects, but rather fixes itself on those in proximity to them, which more directly excite their notice. This constitutes another reason for educating them in such a manner as to extend their visual horizon as much as possible, and hindering them from commencing assiduous application to minute occupations at a too early period.

## § XIX. COMPLICATIONS OF PRESBYTIC AMBLYOPIA, AND THEIR TREATMENT.

In persons whose general health is unimpaired, and, especially, who are not subject to habitual cerebral congestions, presbytic amblyopia shows itself in all its simplicity. It is not rare, however,

to see mere fatigue of the eyes, and work at a distance which the range of vision does not allow, particularly when the objects are brilliant, as is the case, for instance, with jewellers, produce a certain degree of irritation and of ocular congestion, which may extend itself after a time to the brain. In most of the cases, however, where this cerebro-ocular congestion complicates presbytic amblyopia, it has already previously existed; if it supervenes subsequently, it has for its principal causes, the compression of the abdominal organs by sedentary occupation, abdominal plethora, the constipation and dysmenorrhœa so common in women who neglect necessary exercise, especially at the epoch when the development of the body is yet unfinished and menstruation is not yet regularly established. Nothing is more common among the large class of women occupied in work on small objects, than presbytic amblyopia complicated with cerebro-ocular congestion, dysmenorrhœa, and constipation. These pathological conditions singularly favor the production of amblyopia in the presbytic, but may also create it in persons whose sight has an average or even limited range; this is why it frequently happens that the presbytia is misunderstood when it is the principal cause, and that the obstinacy of the malady appears surprising.

It is of the highest importance that these complications should be combated before the patient is permitted to employ convex glasses, and yet more before recurring to excitants. As a com

mencement, purgatives and the necessary venesections, especially derivative, should be employed, together with foot-baths, and cold applications upon the eyes and the neighboring parts. In cases of dysmenorrhœa, the following pills, which I very frequently prescribe, have generally afforded me satisfactory results :

R. Ammoniaci. gum ℥ ii
Aloës ℈ ss to ℥ ss
Syrup. q. s.
M. In pil. L. div.

To act upon the menses, these pills should be given at a dose which produces one or two easy evacuations of the bowels each day. In becoming purgative, they lose their action on the uterine vessels. When they have failed, I have often obtained good results from pills composed of powder and of extract of Sabina, one grain of each, given in the dose of one or two, two or three times a day. When constipation exists, the same pills may be modified in the following manner:

R. Potassæ sulph. } āā ℥ i
Ammoniaci. gum }
Aloës ℈ i
Syrup. q. s.
M. In pil. L. div.

In cases of hæmorrhoïdal disposition or of suppressed hæmorrhoïds, small doses of sulphur, given alone or associated with aloes, have often rendered me excellent service.

When patients cannot possibly abandon their work and exercise their sight only at a distance, we are forced to accord to them an immediate use

of spectacles. They should at least remember that their sight and their future support depend on their interrupting their work from time to time for a few instants, and on their using only the most feeble glasses which they find competent.

When these complications have yielded to the means made use of, successful recourse may be had to the treatment of simple presbytic amblyopia.

Amblyopia by presbytia may also coëxist with all the other species of amblyopia, and with most ocular affections: these, by their union with it, render the diagnosis more difficult, although they often augment the symptoms. This explains the difference between our description and that given by the authors we have cited, who have mistaken its veritable cause, and have made it depend on pathological conditions totally foreign to its production.

Thus, Mr. Mackenzie, (*Ann. d'Oc.*, vol. X., pp. 101, 105, 169,) with a few exceptions, considers this malady as depending upon general debility, an anhæmic state, or a scrofulous constitution, and opposes it by tonics and chalybeate preparations. Incompetent to judge what may be, in England or Scotland, the most common complications of presbytic amblyopia, I have no hesitation in giving the assurance that in France it habitually presents itself as a purely local affection; that among its complications, those with cerebro-ocular congestion, and with dysmenorrhœa or abdominal plethora, are the most frequent; and, finally, that

those with atony or general feebleness, and with anhæmia, are the rarest. There is nothing more natural, than to see this amblyopia, primitively asthenic in its nature, notably increase when it accidentally coëxists with a constitutional asthenia, and to be then amended, like all asthenic amblyopia not accompanied by organic alterations, by the methodical employment of tonics and preparations of iron, especially its carbonate. It is readily seen that it must show itself rebellious to treatment when it coïncides with an enfeebled state of the whole economy, and when its immediate cause, the presbytia, is overlooked; circumstances, which, if this complication is as frequent in Scotland as Mr. Mackenzie represents, perfectly explain the unfavorable prognosis given by this ophthalmologist.

One particular complication of this amblyopia, which may sometimes simulate an intermittent amblyopia or an amaurosis, to the physician who has not made a special study of it, demands a separate consideration.

### § XX. COMPLICATION OF PRESBYTIA WITH CONJUNCTIVITIS, AND THE APPARENT AMBLYOPIA WHICH RESULTS FROM IT.

We have said that the presbytic, having need of much light, sees less distinctly in the evening. If he happens to be visited with a catarrhal conjunctivitis or a simple chronic conjunctivitis limited to the eyelids, affections of which one of the most

constant characteristics is to become exacerbated towards evening, the temporary feebleness of vision which results is so considerable as to put it out of his power to do any work by artificial light, and to greatly disquiet him. This weakening of sight, which arrives more or less suddenly, easily imposes upon those practitioners who are ignorant of the influence which late hours and artificial light exercise upon presbyopia and conjunctivitis. They therefore often imagine the presence of amaurosis, against which they uselessly employ the whole therapeutic arsenal. The differential diagnosis is, however, easily established. Indeed, if the patient is carefully interrogated, he states that it is in the evening only that his sight is troubled, and so much the more in proportion as the light is feeble, his work assiduous, and the ocular mucous membrane injected. The sight is improved if the patient increases the intensity of the light, and especially if he places objects at a greater distance and employs suitable spectacles. During the day his sight is clearer and almost normal; but it is dim if he tries to read or work in badly lighted situations. Thus the attacks have no distinct character, but depend solely on the variations in the intensity of light and the injection of the conjunctiva; which does not permit the malady to be confounded with intermittent amblyopia. These circumstances, joined with the symptoms of slight conjunctivitis, such as superficial injection, gluing together of the eyelids in the morning, smarting or itching, exacerbation of

all the symptoms towards evening, when sensations are felt as if a small foreign body was rolling between the eyelids, etc.; these circumstances, with the absence of the symptoms and causes of amaurosis, are sufficient to establish the diagnosis with certainty.

Absolute repose in the evening, moderate exertion during the day, irritating foot-baths, a laxative, a collyrium containing a small proportion of acetate of lead, sulphate of zinc, or some other astringent salt, the observation of the precautions of hygiene necessary to the presbytic, and, if requisite, the use of appropriate convex glasses; such is the treatment to be put in practice against this complication of presbytia; and, notwithstanding its simplicity and its slight apparent activity, it scatters the morbid phenomena as if by enchantment, to the satisfaction and great surprise of the patient, which surprise I have often seen participated in by physicians. The exciting and spirituous liniments with which the forehead and temples are often ordered to be rubbed, in the belief that a commencement of an asthenic state of the retina exists; as well as the alcoholic and ammoniacal fumigations to which the eyes are subjected, only serve to aggravate the bad condition of the sight by augmenting the turgescence of the conjunctival vessels.

The effects of presbytia being here augmented by the coëxistence of phlegmasia, and this affection often presenting itself in young individuals, it would be injurious to accord glasses of a consid-

erable curvature, and to allow their use to be definitively continued. Nos. 96, 80, or 72, will ordinarily suffice; they should be immediately abandoned after a cure has been effected, unless the age, the degree of presbytia, and the nature of the occupations of the individual, require the contrary. The cure may even be effected without the aid of optical means, if the patient can forego work by artificial light, and only devote himself to it during the day with the objects placed at a distance, and with long and frequent interruptions: the treatment of the conjunctivitis alone may then suffice.

When conjunctivitis complicates a veritable presbytic amblyopia, the dimness of vision is more considerable. During the day it presents the characteristics of this last named affection; at evening the blindness becomes complete, and resembles an amaurosis. These circumstances, joined to that which has been said in § IX. and § XIII., are sufficient to determine the diagnosis: as to the treatment, it is composed of that of the two affections, commencing with that of the conjunctivitis.

## § XXI. PRESBYTIA AS A CAUSE OF OCULAR NEURALGIA.

NEURALGIA of the eye, a malady hitherto little studied, and of which I shall treat with more detail at another occasion, is most frequent among the presbytic; somewhat often it has for sole cause the more or less long focus of vision and the

non-observation of the hygienic rules which belong to this state. In this case, the nervous pains occupy the globe itself, and often extend to neighboring parts, radiating in the direction of the branches of the trifacial nerve. In the commencement. they are felt only after the patient has been some time at work, especially if he does not place objects at a sufficient distance. It will be sufficient to interrupt his work for a few instants, or even place it further from his eyes, to cause a cessation of the dolorous sensations. At a more advanced period the pain comes on nearly as soon as he commences his avocations. Relief is no longer obtained from the same measures. It is necessary to suspend work for a longer interval, and, when it is resumed, place the objects yet further off; to work only for a few moments at once, and occasionally or constantly to employ appropriate convex spectacles, especially by artificial light. These simple means, aided by the general rules we have insisted on, and by fomentations with cold water, and, if necessary, by frictions with laudanum around the orbit, will ordinarily suffice for the cure, if the cause of the disease is early recognized. In the opposite case the disease continues to advance; pain supervenes as soon as the sight is fixed on a near object, — then it begins to be felt at times when the sight has been fixed with any attention on distant objects; — finally it becomes permanent, and its visitations do not spare the organ of vision even during repose; they are irregular, and unequal in their duration.

It is thus even when the neuralgia remains simple; it becomes more intense and more intractable by the effect of certain complications, among which those with rheumatism, dysmenorrhœa, cerebro-ocular congestion, affections of the nervous system, and conjunctivitis, are the most ordinary. The complication with the latter, though somewhat frequent, has been misunderstood, which induces us to make it the subject of special consideration. It may be supposed that it must considerably augment the neuralgia, because the exacerbations of the phlegmasia of the conjunctiva take place in the evening, the time during which the presbytic has the greatest difficulty in seeing clearly.

If the malady has arrived at this degree, and especially when it has lost its original simplicity, its duration must always be more or less long, and its treatment surrounded by considerable difficulties. Absolute and prolonged repose of the organ becomes an indispensable condition. Recourse should be had without delay to the internal and external use of opiates, which are often sufficient to cause the pains to cease. An ointment of Veratrine, (two grains to an ounce of lard,) a quantity equal in size to a pea employed twice or three times a day, has several times rendered us good service when the opiates have been ineffectual. The proper remedies for the rheumatismal and nervous complications, — small blisters transiently applied to the forehead and temples; in the case of coëxistence of conjunctivitis, astringent

collyria, and even, if necessary, if there is a commencement of granulations, light cauterization of the internal surface of the eyelids with sulphate of copper, — will not be neglected. But all these means will remain ineffectual if work is not suspended for a long time at the commencement, and regulated, after the occupations are resumed, at first as is proper for individuals affected by presbytic amblyopia, and afterward as for the presbytic in general.

Neuralgia depending on presbytia ordinarily exists in both eyes at once. When the contrary is true, examination should be made if the cause of this exception to the general rule is not due to an inequality of focus, which would require stronger glasses for the eye the least able to work.

The use of too powerful glasses, also, may give rise to neuralgic pains in the eyes; but this is more rarely the case. (Vide § XXIII.)

Instead of neuralgia, presbytia sometimes produces, particularly in persons of a nervous temperament, nervous twitchings of the eyelids and the muscles of the face, such as winking and the tic-non-douloureux. These movements manifest themselves after work at too short a distance, and are ordinarily complicated with presbytic amblyopia. All the causes which may increase this, as, for instance, the coëxistence of conjunctivitis, render them also more intense and more rebellious to treatment.

## § XXII. MYODOPSIA PRODUCED BY PRESBYTIA.

The names of *myodopsia*, *muscæ volitantes*, *flying filaments*, *perpetual imaginations*, etc., have been applied to the phenomenon of the apparition before the eyes of filaments or moving points of various forms and of a more or less sombre color. The immediate cause of this phenomenon is yet unknown to us, though different explanations have been attempted. Some consider them as depending on opacities in the refractive media, especially in the aqueous humor and the liquor of Morgagni. Recently a hypothesis has been proposed that they might sometimes be occasioned by the presence of microscopic entozoa in the interior of the eye. Others have regarded them as produced by varicosities and obstructions of the vessels of the internal membranes. Others as a nervous phenomenon. We believe that in the majority of cases they are a symptom of simple aberration of the sensibility of the retina, a veritable hallucination of vision, and that in some less numerous cases they depend on an internal ocular irritation; that opaque corpuscles or animalcules can only cause them in entirely exceptional cases; finally, that the small varices of the internal membranes produce fixed spots rather than flying filaments. It is not our plan to treat these questions in full, but a rapid sketch of the pathognomonic symptoms of myodopsia and of scotoma will not be misplaced.

Myodopsia is characterized by the appearance, sometimes periodical, sometimes constant, of tortuous filaments or points moving in different directions in the field of vision. These small spots, always multiple and sometimes very numerous, are most frequently linear, in the form of little serpents or worms, and of a gray pearl color, diaphanous and watery; but sometimes they are rounded and of a darker color, nearly black.

At the moment when an object is looked at, they never occupy its centre; thus, for instance, if letters on a page are looked at they never cover them with an opaque veil which hinders their recognition. They fly laterally before objects, at some distance from their borders. In reading, they are usually seen on the white margin of the page, or a little without or within this margin, and never on the centre of the printed portion. If they offer less mobility at any time, a slight sudden movement of the head instantly displaces them, throwing them beyond the field of vision. Upon white surfaces placed in a vivid light they become more apparent. When the eyes are turned upwards to an elevated object, such as a wall, they follow the same direction; but if the look is retained there, and the eyes remain for some instants immovable, they slowly descend, and, finally, entirely disappear. They are often seen when the eyes are closed.

This phenomenon almost always depends on an irrational use of the organ of vision: sometimes an excess of work; sometimes an exposure to too

vivid light; sometimes the exercise of sight at a range disproportioned to its natural capacity. When these causes continue to act, an irritation of the internal membranes, or, more rarely, a commencement of asthenia of the retina, may be united with it. This has often caused myodopsia to be regarded as a precursory symptom or concomitant of amaurosis; but there is no reason for considering it as such, since it may exist during the whole life without leading to other consequences. In cataract, where it is observed infinitely less frequently than is ordinarily stated, it is more frequently, in my opinion, a complication due to the already described causes of myodopsia, than a symptom of alteration of the crystalline.

In the presbytic, flying filaments sometimes show themselves after work at too short a distance and without spectacles, although there is not yet presbytic amblyopia. This is especially true when a single eye supports the fatigue, in consequence of the inequality of focus which we shall presently consider. In these cases, as in all those where it exists in a simple state, myodopsia is without danger, and may be regarded as one of those appeals by which nature calls attention to an organ when the integrity of its functions is menaced. A temporary repose and the observation of the hygienic rules suffice to arrest the progress of the affection, or even to cure it, whether it be produced by presbytia or by another cause. But, as a general rule, muscæ volitantes are rarely and with difficulty got rid of.

If in myopes, as will be proved, the abuse of too powerful glasses is the most usual cause of myodopsia, the same cannot be said of the presbytic. The use of convex glasses of too high a number rarely gives rise to the production of this phenomenon in them.

It is very important not to confound flying filaments with *scotoma*. We thus designate a spot, of greater or less size, of round form and dark tint, deep gray or black. Motionless and rarely multiple, it always preserves the same relations to the visual axis, and usually occupies its centre, or that vicinity. It covers a portion of the object at which the patient looks, where he believes that he sees a species of gap or a spot which hides a portion, usually of its centre. This affection should be considered as an insensibility of a limited portion of the retina, depending either on the obstruction or varicosity of one or other of its vessels, or on the paralysis or even disorganization of some portion of its nervous pulp ; it is consequently symptomatic of commencing amaurosis. This opaque and dark spot enlarges with the progress of the malady, and may end by invading the entire field of vision and producing complete blindness. This symptom is not found in the cortége of presbytic amblyopia ; it might, however, accompany it when it had arrived at the degree of veritable amaurosis. It is sometimes observed in advanced amblyopia consecutive to the use of powerful glasses. (§ XXIII.) Scotoma is always a symptom of bad augury, since it indicates a

profound though circumscribed affection, which already tends to a disorganization of the retina and resists, for a long time, all curative means. The treatment will be regulated according to the character of the amblyopia which this phenomenon accompanies.

In a few very rare cases, where the myodopsia was from the first accompanied by symptoms of retinal irritation, I have seen the floating filaments become fixed, transformed into one or several scotomes, and followed by amblyopia or amaurosis.

## § XXIII. INJURIOUS EFFECTS OF TOO POWERFUL CONVEX GLASSES, ESPECIALLY WHEN THEY ARE EMPLOYED FOR SEEING AT A DISTANCE.

If the habit of bringing objects too near changes the compass of vision to a most serious extent, and notably diminishes the faculty of accommodation, convex spectacles produce the same effect in a higher degree; they fix and bind vision to a certain distance. In order to read and write at different distances with convex glasses, or to see remote objects with concave ones, these glasses should have a different curvature according to their destination.

Generally speaking, every person, whether presbytic or myope, can make use of glasses of different curves; only, with the stronger numbers he sees more clearly, and is forced, if presbytic, to bring objects nearer; if myopic, to place them

further from the eyes, but without thus causing them to be magnified or diminished in volume. The more powerful the glass, the less latitude it allows in the position of bodies looked at. The feebler spectacles allow this position to be varied to a certain extent without any notable change in the distinctness of the visual perception ; an evident proof that these glasses of slight curvature allow the conservation of a certain degree of the accommodative faculty. An example will make what has been said more intelligible, and will facilitate the comprehension of the conclusions which we shall deduce from it : a presbytic person who has never yet employed spectacles, but has not allowed the opportune moment for their adoption to pass by, can generally read equally well with Nos. 72, 66, and 60 : he will however find, if he pays strict attention to his sensations, that with the last-named number he will be compelled to bring the book nearer, and to hold it more invariably at the same distance ; whilst the first obliges him to place it further off, and permits him to bring it nearer or remove it, within a certain distance, without his sight becoming dim or sensibly fatigued. Those more feeble glasses, then, permit the preservation of a certain degree of the faculty of accommodation, which those of greater curvature diminish and end by abolishing, in a manner more positive in proportion as their use is more constant. If the eye can make use of several numbers solely by changing the position of the objects, it is because it accommodates itself to the

focus of the glasses. Once habituated to a shorter focus, it cannot, without difficulty, return to more feeble glasses; this difficulty, always proportioned to the power of the spectacles, may end by becoming insurmountable when this power has been excessive. Thence results the high importance of the precept we have given, always to choose at first the most feeble number with which the patient can distinguish clearly and without fatigue, without change of the apparent volume of the objects, or without being forced to place them at a distance very different from that which the unassisted eye admits of. A presbytic who can employ, with nearly equal facility, Nos. 72, 66, and 60, by using the last for some time would accommodate his sight to this number. The modifications which age effects in the visual organ making their inevitable progress, he will be forced to change his spectacles at a given time, and much sooner than would otherwise be requisite, because the accommodation of the sight to spectacles of too great power is soon accompanied by fatigue and a want of clearness of vision, like all too continuous exercise of the adjusting faculty, especially at short distances.

He has then again to select among several numbers of which the effect will appear to him to differ very little, as Nos. 54 and 48. But, for the same motive as before, he will infallibly choose the strongest, as being that which apparently renders him the most efficacious aid. Thus the progression is very rapid; the further it descends, the

more the glasses destroy the faculty of accommodation, not only during their use, but also during the time when they are laid aside ; for, bound as it were to the focus of the spectacles during all the time they are worn, the sight no longer easily adapts itself to greater distances. Thus the presbytic who employ more feeble numbers can yet read for some time with the naked eye, and preserve all the integrity of their visual range for remote distances, whilst those who constantly read or work with powerful glasses end by finding themselves unable to dispense with them, and often even can no longer see large objects as far as formerly.

If, then, after having seen perfectly well with spectacles of a certain number, a person uses, without reason, or for experiment, glasses of greater power, he will find, at the end of a few weeks of their employment, that, on returning to the number primarily used, he sees infinitely less well than formerly, if he can see at all; an evident proof that spectacles limit the focus, and diminish the adjustive faculty, which they may end by destroying. That which might in this respect be assumed *a priori*, is confirmed, in each point, by experience, which proves at the same time that it is of the highest importance to proceed rationally in the choice of spectacles, and to begin, according to the rules we have endeavored to establish, by those of the feeblest power, substituting others of greater strength by insensible degrees. Here, as everywhere, the physiological

laws forbid sudden transitions, which by their shock produce a disturbance which is almost always injurious to the function.

This general law, in its relations with the optical auxiliaries of vision, appears to have escaped the notice of ophthalmologists and opticians. Very little has been hitherto said in regard to the manner of fixing the successions of the numbers of spectacles for the presbytic. In particular I do not remember to have seen anything in the books in regard to a pathological state, which I have often observed as a consequence of the ignorance in which the presbytic are generally left upon this point; it is a species of amblyopia, sometimes far advanced, and which sometimes arrives at the degree of amaurosis, and is solely produced by the use of too strong convex glasses. The most attentive examination does not discover any local or general complication, nor any cause capable of having aided in the production of the affection. The malady often manifests itself in the following manner: A moderately presbytic individual feels the necessity of making use of spectacles. Let us suppose that those which hazard places in his hands, or that ill-judged advice recommends to him, are of Nos. 48 or 36; to his great delight, during the first short trial he sees very clearly and without the least fatigue. Ignorant that with infinitely more feeble glasses he would have seen quite as well without at all fatiguing his eyes, he definitively fixes his choice on No. 36, a number very strong for him, and which gives an abnormal

degree of clearness to his vision, an excess of precision, comparable to a species of oxyopia, which, like the latter, soon produces fatigue, dazzling, and other similar morbid symptoms, depending on the permanent and *outré* exercise of the accommodative faculty. It is evident that whenever a feeble number, as, for instance, No. 72, suffices to produce the desired effect, a stronger one, as No. 48, must require an excess of adaptation, which is continued during the entire period of the use of spectacles, and which, like every too long continued accommodation of vision, must become fatiguing and enfeeble the sight. When this state of things has persisted during some time, the fatigue, at first transitory and light, becomes permanent, and constitutes a veritable visual dimness, which the patient explains by the insufficiency of his spectacles. Believing that he requires stronger ones, he changes anew; he sees better in the beginning, sure to experience the same phenomena at the end of a certain lapse of time, when his sight has again adapted itself to the new glasses. However, the visual trouble often comes on only at a late period, especially if the first glasses have not been too strong, and the changes have only been made at distant intervals. On the contrary, vision fails faster if the patient begins with very strong numbers, such as 24 or 18, as was formerly often the case, and if he changes them frequently. This must take place much oftener if the elevated scale is made use of which we have several times mentioned as debuting with too high numbers, and

which is still continued in favor by Mr. Mackenzie and by many opticians. Some other circumstances favor and accelerate the development of this amblyopia. Many persons have the habit of not placing their spectacles close to the eyes, but allowing them to descend more or less upon the ridge of the nose, without dreaming that this augments their refractive power; they thus virtually employ numbers infinitely stronger than those prescribed to them. Others, when they undertake any work, either more minute than usual, or by a diminished light, place a second pair of spectacles, often strong ones, over those which they habitually wear. Yet others frequently employ in reading, lenses of greater or less magnifying power, (called reading glasses,) either instead of their spectacles, or, which is much worse, wearing the latter at the same time. The frequent use of the microscope may also increase the hurtful action of spectacles. Many presbytic persons, following the counsel too often given by physicians and opticians, employ convex glasses of a more or less dark, blue or green tint, and that even in dimly lighted apartments or by artificial light. If we recollect what has been said in § IX., in regard to the somewhat considerable degree of light which the presbytic needs for all minute work, we shall perceive that the more the convex glasses he may employ are dark or opaque, the less clearly he will see, and the more he will become fatigued. Consequently, the dark tint is not only useless, but very injurious; the deeper it may be, the more he will be

compelled to descend to low numbers, and the more even an elevated number will enfeeble the vision. The same is true of glasses clouded or scratched from want of care in wiping and laying them down, (vide § VI.) Spots and cicatrices of the cornea may produce a similar effect in rendering the sight less distinct, and obliging the patient to make use of more powerful glasses; the choice in these cases should be made with the greatest precaution. Whatever may have been the cause which produced this affection, the clouding and enfeebling of the sight finally become such that the patient can only read with difficulty with any species of spectacles. He is the subject of an advanced amaurotic amblyopia, which remains stationary as long as he does not further augment the power of his glasses, and employs them as rarely as possible, but which rapidly increases if a contrary course is pursued. This amblyopia has the following characteristics: it is not primarily accompanied by any symptom of congestion or of organic cerebro-ocular alteration, nor by any other constitutional affection. No general or local cause of asthenia of the retina or of the optic nerve can be discovered. When the patient has dispensed with his convex glasses in guiding himself or in looking at distant things, the power of his vision for remote objects, although lessened, is yet considerable. Aided by his spectacles, though they are very powerful and disproportioned to his age and the primitive focus of his sight, he sees small and near objects only indis-

tinctly and with great fatigue. With spectacles of yet greater power, the clearness of sight is little, if at all, improved; the fatigue is undiminished, or it augments. Sometimes, even, the patient sees as well with the naked eye as with his glasses. If, placed in these circumstances, the patient continues to work, to read or write with the aid of spectacles, and continues obstinately to recur to glasses of a higher refractive power to obviate the difficulty of sight, the trouble he finds in pursuing his avocations is speedily augmented. Then, at the end of a certain time, the compass and clearness of his vision at a distance, already diminished, decline yet more; he is compelled to employ convex glasses for seeing at a distance, and sometimes even for his guidance in his walks, — which accelerates the march of the malady. Thus the amblyopia augments more and more, and ends by attaining the degree of a veritable amaurosis, that is to say, by preventing him not only from reading, but even from guiding his own steps.

When the patient has from the first employed spectacles for seeing at a distance, the affection arrives more rapidly at its apogee, because he is thus obliged to recur sooner to too strong glasses for reading and work. I have seen persons who employed No. 24 for long distances, and No. 6 or 8 for reading; others who employed a very strong number, as No. 18 or 14, to guide themselves, and who possessed another number, of equal or greater power, which they placed over the first when they

wished to read or write. Yet others employed the same, and an excessively powerful number, both for reading or work and for seeing at a distance; which perhaps produces the worst effects of any of the combinations, since it forces the sight to accommodate itself to the short focus even for distant objects. It also often leads to a certain degree of acquired myopia. How can the sight be otherwise than injured and finally destroyed by the use of concentrative glasses so powerful that they enable myopes to read after a successful operation for cataract, the presbytic consequently employing an auxiliary means equivalent to the crystalline, and doubling the natural refractive power of the eye?

These considerations naturally conduct us to notice an error generally entertained among the people, and shared by a good number of opticians and ophthalmologists; among the latter we regret to find Mr. Mackenzie. It is an error, in our opinion, to believe that the presbytic at any period has need to employ convex glasses, even though feeble, for seeing at a distance. The presbytic, as we have already said, and as we again insist, never requires them for distant vision, if he observes the special hygienic rules we have announced, and especially if he has not at first employed too strong glasses for work. However feeble they may be, they will be useless, and after a time prejudicial to him. When he does feel the necessity for them, it is not in consequence of a simply physiological and normal condition of the

ocular refraction, but of a pathological state. Sometimes he has employed too powerful glasses for work; sometimes has used, for seeing at a distance and to guide himself, too deeply tinted plane glasses, which enfeeble the sight of the presbytic, or convex glasses, which some injudicious optician had given him, representing them as simple conserves; finally, he is sometimes the subject of a veritable amblyopia not depending on the use of spectacles, but produced by other causes,— an affection which he mistakes, and wrongly attributes to a natural alteration of his sight by age. This amblyopia, at a certain period, gives rise to an alteration in the focus of vision, an alteration which is augmented by the use of optical means, and can only be removed by the cure of the principal affection, the rational treatment of which requires the employment of means based upon a knowledge of the nature and the causes of the disease. Among these means the repose of the eyes and the suspension of the employment of every species of spectacles hold a prominent place.

When the presbytic begins to see less clearly at a distance, instead of trying to remedy this defect of vision by means of glasses, he should suspend work and the use of spectacles, and seek to ascertain the general cause which may have produced this alteration; he should inquire, to begin with, whether too strong spectacles may not have been the prime cause. Sometimes a senile amblyopia, depending solely on the enfeebling

inherent upon the progress of age and the wear and tear of the organ, will be discovered; the treatment of which is difficult; and which is hastened in its manifestation and progress by the use of too powerful glasses. Tonics and stimulants are generally required.

### § XXIV. TREATMENT OF AMBLYOPIA CAUSED BY THE ABUSE OF CONVEX GLASSES.

This treatment is analogous to that of presbytic amblyopia uncomplicated with congestion, but far advanced; it should be active and persevering. Its cure requires, above all, absolute repose of the sight, at least temporarily; exercise of the eyes upon large distant objects, and suspension of the use of convex spectacles, ordinarily for a considerable time, but at least for several weeks. The use of tinted glasses should be condemned, if they have contributed to the production of the malady, or, if allowed, they should have but a slight shade and be worn only when exposed to brilliant light. Fomentations of cold water, to which a little brandy may be added, and a spirituous liniment, should be prescribed. To this should succeed the liniments of strychnia, camphor, ammonia, in gentle frictions upon the forehead and temples, and in vapor directed upon the half-opened eyes. If the affection does not cede to these means, flying blisters may be placed upon the same regions, and, if necessary, after a little

time they may be dressed with a minute quantity of strychnia, which may be gradually increased.

In old or feeble individuals, and in those who have greatly abused their eyes, diffusible stimulants, as æther or arnica, may be given internally: this last enjoys the reputation of a special stimulant of the retina and the optic nerve. Perhaps pulsatilla might be employed in these cases with some chances of success, since, according to the experiments of Stoerck and other observers, it appears to exercise a peculiar action upon the ocular globe, in which, as stated by this physician, it produces painful sensations. I have not had occasion to try it.

It is important to limit one's self as long as possible to the use of these means, to repose of the eyes, and to the exercise of these organs at a distance, before recurring anew to the use of convex glasses. When that is done, they should be selected as feeble as possible; they should at first be worn only during a few minutes, with the objects placed at a distance, and with a careful observance of all the rules recommended for the presbytic and for presbytic amblyopia. They should be commenced as late as possible, and only with a number of just sufficient force to allow of reading. Another number will be substituted, after a time, stronger or more feeble, according to the effect produced.

Unless the use of spectacles is suspended for a long time, and much less powerful ones taken, no cure can be hoped for. It is especially of the

highest importance to hinder the patient from employing glasses for seeing at a distance, or, if he is not in a state to guide himself without spectacles, to accord to him only very feeble ones when he is obliged to go out alone. The power of these glasses should be diminished more and more. Whenever the patient can procure a guide, or remains at home or within the limits with which he is familiar, he should lay aside his spectacles.

The *complications* of this species of amblyopia are rare and few. If symptoms of cerebro-ocular congestion exist, they should be combated according to general rules. Scratched glasses should be exchanged for those of perfect polish, and those of too dark a tint for lighter shades or for those which are colorless. The patient must be careful to place them very near his eyes and parallel to the plane of the iris. If partial opacities of the cornea are too inveterate to permit a hope of notable amelioration by topical applications, the greatest care should be bestowed to choose glasses exactly proportioned to the visual focus, and neither too weak nor too powerful; either of these extremes might become pernicious. A little darker bluish tint is here advantageous, principally when the cicatrices are central, especially in a bright light where the contraction of the pupil hinders vision. Spectacles of proper focus should be substituted for any other description of glasses.

We have traced the characteristics of this particular form of diminution of the visual faculty as we have very frequently observed it. How can the phenomena it presents, and the cause which so constantly produces it, be reconciled with the advice given,—at first, it is true, by charlatans, but afterwards by some distinguished physicians,—to individuals afflicted with amblyopia, and even with almost complete amaurosis, that they should work from four to ten hours a day with very powerful convex glasses? Reflection upon what we have already said, (§ XV.,) will furnish a ready answer. This practice, deducting some fortuitous cures, which are never wanting even to the most irrational treatments, could never be successful, setting aside the cases of inequality of focus in the two eyes, of which we shall hereafter speak, except in misunderstood presbytic amblyopia, or in amaurosis in presbytic persons, which would certainly have been as well and perhaps better cured by feebler glasses and the treatment we have recommended. We have accordingly seen the exclusive use of glasses of too great convexity fail in more cases than it succeeded, and produce calamitous effects in many others.

The use of too strong convex glasses also sometimes produces myodopsia and neuralgic pains, though more rarely than work with the naked eye at a too near distance. And in the cases where these affections supervene as a consequence of the abuse of spectacles, they are rarely simple,

but almost always accompanied by a commencement of enfeebling of vision.

I have seen some presbytes who, having notably enfeebled their sight by the use of too powerful spectacles, could neither read, write or work without winking, that is to say, without contractions of the eyelids so as to diminish the opening between them, and to exercise pressure on the globe of the eye. The same phenomenon has presented itself in some young presbytes who had contracted a beginning of amblyopia by work at too short distances. One of them at the same time experienced diplopia, especially in looking at distant objects. Comparing these circumstances with that which has been said respecting winking in myopes, (§ IV.,) and of the coëxistence of a certain degree of acquired myopia in several of these cases, several new inductions may be made upon the influence which nictitation and the general muscular contraction exercise on the adjusting faculty. But, our documents not being sufficiently numerous, we shall adjourn their publication and the conclusions to be drawn from them.

## § XXV. A SPECIES OF CONGENITAL AMBLYOPIA COMPLICATED WITH PRESBYTIA, AND ORDINARILY TAKEN FOR A VERY HIGH DEGREE OF MYOPIA (CONGENITAL PRESBYTIC AMBLYOPIA.)

Somewhat often a congenital amblyopia is seen, sometimes produced by primitive asthenia of the retina, sometimes by a defective organization of

this membrane. Like simple amblyopia, in general, this particular species is more frequent in presbytes. On account of this congenital feebleness, the presbytia does not here manifest itself by long-sightedness, but rather by fatigue promptly supervening during work upon near objects, especially when these are of small dimensions and insufficiently lighted. Individuals thus affected require a very bright light; they cannot work without it. They often experience a certain degree of veritable hemeralopia, and have difficulty in guiding themselves at twilight or in dimly lighted situations. In this case, we sometimes observe the instability of the eyes, so frequent in congenital blindness or that of long standing, which has been named nystagmus; but in this instance the oscillation is not so marked. Not having a long compass of vision, but, on the contrary, seeing less distinctly at a distance than most persons about them, these patients believe themselves myopes. However, they see large objects at moderate distances better than small near objects, which they cannot assiduously look at without soon experiencing considerable fatigue. They read a large print with more ease than a small type. All these circumstances lead them, little by little, to bring their eyes near the object of their employment; they thus at length contract a certain degree of myopia, which renders the diagnosis very difficult at this period, especially if they have for some time made use of concave spectacles. Until this period, however, the signs of the affec-

tion we are describing are sufficiently marked to serve as a basis for a positive diagnosis.

The myope, his point of distinct vision being once ascertained, can work a long time without experiencing any fatigue ; he sees distinctly even by a feeble light. Persons afflicted with the amblyopia of which we speak are readily fatigued by work, and can perform it only in a bright light. In the beginning of the affection, they see the same object better by removing it a little further than by bringing it nearer the eyes. With even feeble concave glasses they see no better at a distance; on the contrary, objects appear smaller, indistinct, and confused. If they attempt to employ these same glasses for working, all objects become confused together; they experience dazzling, lachrymation, and a fatigue which after a time becomes painful; sensations which prevent their seeing, and force them momentarily to suspend their occupations. On the other hand, they work better without spectacles, by removing objects a little further, or with convex glasses with which they are not compelled to bring them much nearer, and which, to be of service to them, should be somewhat powerful. It would, however, be dangerous to accord them too soon, or to permit them to be of too high a power; it is better to withhold them as long as possible. These spectacles neither give the same clearness of sight nor the same faculty of sustaining prolonged employment, which they afford to simply presbytic persons. To produce an appreciable change in the

degree of vision, they should be of a low number, that they may serve as magnifying glasses, as in amblyopia, and not as simple presbytic glasses. It is often seen that children having this affection diminish their sight yet further by adopting for habitual use the strong convex glasses of an older member of the family, which chance has placed in their hands, and with which they work with greater ease. It is also by a similar chance that it is discovered that a supposed short-sighted child is not really so. We can conceive that, by a rare exception, a similar congenital amblyopia might exist in a primitively short-sighted individual, who, nevertheless, would see more clearly and for a longer time by the aid of convex glasses, because they magnify the objects of his occupation; but to make the diagnosis sure, the fact will always exist that with these glasses he will be forced to bring objects nearer to him, and that strong concave glasses will not only render large distant objects more distinct, but will enable him to read in removing the book to a greater distance, provided that he has not already used convex glasses for too long a time.

### § XXV½. TREATMENT OF CONGENITAL PRESBYTIC AMBLYOPIA.

As in most congenital affections, a complete and radical cure is here impossible. In most cases, however, if seconded by the patient and his family, we may prevent the affection from

making progress, and even give to the sight of the patient enough force and stability to enable him to pursue all necessary occupations.

It is a very difficult point to persuade the patient and his parents not to commence too soon the use of spectacles. Ordinarily, concave glasses are earnestly demanded ; it is fortunate if he has not already worn them when he comes for advice. If he has employed them during a long time, has used a powerful number, has availed himself of them even for reading and writing, all we can then hope to accomplish is reduced to enabling him to make use of feebler glasses, and giving to his sight a little more power and endurance for work ; but he remains myopic, and cannot usefully follow any pursuit requiring prolonged occupation of the eyes. This is one of the cases where kopiopia, apparently existing in the myopic, might be cured or ameliorated by myotomy, with simultaneous augmentation of the compass of vision. The habitual and long use of strong convex glasses also renders the prognosis unfavorable; but, however difficult it may be to disaccustom an individual to them who can scarcely read without their aid, it may yet be done, or at least much less powerful numbers may be substituted, provided the individual affected with this species of amblyopia has not yet employed spectacles of this kind for his guidance. In this last hypothesis, all is lost, almost as infallibly as if the patient had employed concave glasses.

The first rule, then, is to insist that he assume glasses, no matter of what species, at the latest possible moment, for work, and still more tardily for his guidance. He must exercise his sight at a distance, and will only work when that is unavoidable, and observe all the rules given for presbytic amblyopia; following them a much longer time and far more rigorously. He must be careful to place objects at a distance, at the exact limit of distinct sight, and to work very little and by fractions, during a minute only at a time. The parents should be informed that a complete cure is impossible, and that a notable amelioration is much more the result of time and a proper and persevering exercise of vision than of a medical treatment. The eyes should be bathed with cold water to which a little brandy has been added; spirituous liniments carefully increased from a slight strength; small flying blisters upon the forehead, temples and cheek-bones, may all concur to fortify the sight. If there is no special contra indication, the endermic application of very feeble doses of strychnia may be attempted. This amblyopia often exists in individuals of debilitated, nervous, lymphatic, or cachectic constitution, which should be modified by nutritious food, by diffusible, unirritating excitants, such as valerian, arnica, etc., by cold, saline, gelatinous or ferruginous baths, and by the internal administration of the anti-scrofulous, tonic, and ferruginous preparations. Complication with chronic cerebro-ocular congestion is much rarer; I have, however,

several times observed this condition, and successfully opposed it by a moderate derivative and antiphlogistic treatment, which should terminate with the cessation of the congestive symptoms, at the risk of augmenting the asthenia of the retina.

After having been limited as long as possible to the rationally directed exercise of the sight and to the use of the measures above indicated, convex glasses may be resorted to.

Here, also, reason and experience force me to regard it infinitely preferable to begin with the feeblest glasses which give an appreciable result, but which should always be much more powerful than in simply presbytic persons. If, after some time, they do not afford to the sight a force and endurance sufficient for work, their power may be very gradually augmented. They should not be allowed for seeing at a distance ; the use of plane colored glasses, which unhappily are too often recommended, and of which the action is pernicious, as in all asthenic amblyopia, should also be interdicted. They can only be useful in very bright light, when it is a source of inconvenience and annoyance to the patient by disturbing his vision. As for the use of strong convex spectacles, of which the power should be progressively diminished, it appears to me indicated only in case this affection has almost arrived at the degree of veritable amaurosis, and when, after a long repose, exercise of the naked eye upon distant objects, and general treatment, the amelioration is not sufficient to place the patient in a

condition to use convex lenses of a less power. In this case, an essay should often be made to substitute feebler glasses for those first chosen. By successively diminishing their power, it is sometimes possible to obtain, not a cure, but a notable amelioration. The following observation, which I have often had occasion to make, has made me especially prefer the slow augmentation of the power of glasses. When children affected with congenital presbytic amblyopia have made use of too strong convex glasses, by accident or from having been thus advised, the results are less serious than after the employment of concave glasses; but the weakness of sight always remains considerable, and they can never dispense with these auxiliaries, which, after a given time, no longer render the same assistance. After the spectacles have been several times exchanged for others, a point is at length reached where none can be made serviceable, and it is necessary to renounce their use. A condition bordering upon amaurosis then exists. The important point is to continue the exercises of vision and the general treatment as long as possible before again recurring to spectacles; to choose them feeble at first, or, if exceptionally more powerful ones are taken, to wear them a few minutes only at a time, and to endeavor, at the end of a few days, or a week or two at farthest, to exchange them for others of a higher number.

The treatment is yet more difficult, if concave glasses have already been employed. When the

myopia has been allowed to establish itself by an indulgence of the habit of bringing objects too near, and by using concave glasses, it remains fixed, as we have already said. The same therapeutics are applicable here, except the use of convex glasses. With great perseverance, the patient may be thus brought back to the use of much feebler concave glasses, and obtain an increase of power in his visual faculty.

The question of the profession which should be selected for children afflicted with this amblyopia, is a very difficult one, on account of the weakness of the organs of vision ; the choice is limited, especially when pecuniary considerations require that the patient should support himself by his own exertions. The career of study, all the professions which require assiduous reading or writing, or persevering occupation upon minute near objects, must lead to the prompt exhaustion of the organ, and to blindness. He can scarcely choose other employment than that of salesman, (the buying and verification of goods being entrusted to others,) of farmer, gardener, cooper, blacksmith, carpenter, or domestic. For females the difficulty is yet greater ; they can only attend to the affairs of house-keeping, or become domestics, or chamber-maids ; every kind of needle-work is injurious to them. This restricted choice greatly embarrasses the practitioner.

From all which has been said, it follows that myotomy will render a signal service in presbytic amblyopia, if its good effects are confirmed by

experience, as appears probable. Its principal application will be found in this malady, especially when the latter is already accompanied by shortening of the visual focus, as also in acquired myopia, particularly when this affection, which will be the subject of the next section, is complicated with enfeebled vision. We shall not allow an occasion for employing this method to be unimproved; but we have not as yet found such an occasion, because the individuals to whom we have judged the operation applicable, have been unwilling to decide on its performance, or have not been long enough under our observation. Unfortunately, it is to be feared that this operation will not be successful when the disease, seated principally in the retina, is far advanced and already bordering upon hemeralopia or even amaurosis. On the contrary, we may hope for a satisfactory result whenever the refractive media and the apparatus of adaptation to different distances have the principal share in the production of this congenital amblyopia. After the operation, the observance of the rules of hygiene, and, if I may be permitted an expression already employed by other ophthalmologists, of ocular gymnastics, should not be neglected.

## § XXVI. VARIETIES AND COMPLICATIONS OF CONGENITAL PRESBYTIC AMBLYOPIA.

THE *varieties* of this affection are not numerous. Its less advanced degrees may simulate simple

presbytic amblyopia, and resist the ordinary means employed against the latter.

Obstinate presbytic amblyopia in persons little advanced in age is most frequently complicated with a certain degree of congenital amblyopia, or at least with a congenital weakness of the eyes which borders very close upon amblyopia.

It is not rare to see congenital presbytic amblyopia affecting one eye only, or at least fixing itself there in a more special manner. Strabismus, and even amaurosis, may result. It is here that the use of strong convex glasses, after the method of M. Cunier, is very useful. We shall return to this point in the chapter which we shall devote to the inequality of focus of the two eyes.

*Complications.* We have already spoken of the complication with cerebro-ocular congestion. We have only to add that when cicatrices of the cornea, or central capsular cataract exist, as is frequently a consequence of the ophthalmia of the new-born, the difficulty of vision is thereby greatly increased. In addition to the use of topical applications to the cicatrices, it is necessary to have recourse to stronger glasses, which renders this complication one very much to be deprecated.

### § XXVI. *a.* ACQUIRED MYOPIA, OR PRESBYTIA CHANGED TO MYOPIA.

As the presbytic can only follow his pursuits by constraining his eyes to act at a too short focal distance, it is readily conceived that assiduous

labor, in these conditions, must end in the destruction of the faculty of accommodating his sight for a clear perception of distant objects, and in shortening his natural focus even to the degree of causing him to contract a secondary myopia. By the simple fact of the continuation of the occupations which have effected this transformation, this myopia tends always to augment, and this tendency is often aided by circumstances; for, in ignorance of its determining causes, and to obviate this hindrance in the execution of work, the patient is advised to wear concave glasses, the certain consequence of which is to aggravate his condition. Acquired myopia has different degrees and divers varieties; each of which requires that some modifications should be made in treatment.

### § XXVI. *b.* FIRST VARIETY.—SIMPLE ACQUIRED MYOPIA, WITHOUT WEAKNESS OF VISION.

At the commencement, the myopia is rather apparent than real; it is a long-sightedness which has been forced to accommodate itself, little by little, to too short distances. The sight of the patient shortens slowly and insensibly. He feels, or those about him at length perceive, that he becomes myopic, that is to say, that he is forced to bring objects nearer and nearer during his work. However, his sight is not at first diminished, or, at least, is not so to the same degree, for large distant objects; but, little by little, he observes also a lessening of the compass of vision

for these objects, which lose their distinctness, become as it were enveloped in mist, and are only clearly perceived when they are brought much nearer than he had been accustomed to have them. The longer this condition lasts, the more he is compelled to bring objects nearer, whatever may be their dimensions or distances. In the commencement, concave glasses render distant things smaller and dimmer, and produce a sensation of dazzling, and of difficult perception ; moderately strong convex glasses, on the contrary, facilitate reading and writing, permitting him at the same time to place himself very nearly in the same position as for employing the naked eye.

When the affection is further advanced, the state of things changes ; he can no longer read or write with convex glasses, except by stooping forward, and, on the other hand, he begins to distinguish distant objects better with moderately strong concave glasses, which now do not diminish their size: he has become myope. Ordinarily, these changes take place very slowly, and in persons who, without working too assiduously, have a habit of bringing objects too near. This is acquired myopia in its greatest state of simplicity. Its development is usually very slow and often rather obscure in its progress, but it is sometimes possible to trace the characteristics we have described with perfect distinctness. This affection, and the manner of its development, furnish one of the most conclusive proofs of the existence of the

accommodative faculty; the structure of the crystalline does not at all explain it.

We have already said that a considerable number, and perhaps the great majority, of short-sighted persons have become so in this manner. In children, especially, this acquired myopia supervenes very frequently, and, in most cases, slowly, in consequence of the bad habit, which they so easily form, of leaning forward over their work,—a habit which it is important and easy to prevent by a little attention and strictness.

In this form of acquired myopia the organ of vision preserves all its other normal conditions, provided objects are placed at the requisite distance; nothing has been lost in distinctness of vision. The myopia once confirmed, work may be as much prolonged without fatigue as before the development of the affection.

*Treatment.* When the malady is neither very ancient nor far advanced, it is sufficient, to arrest its progress, or even to create a retrograde impulse, to cause objects to be removed, little by little, to greater distances, according to the rules we shall establish for myopia in general; but a more severe surveillance is here necessary. Work should be very frequently interrupted, and the intervals should be devoted to observation of distant objects and to bathing the eyes with fresh water. This very simple treatment, if early and perseveringly employed, especially if the subject is still young, is sufficient to obtain a complete and radical cure, and to restore the primitive focus

of vision. Spirituous liniments, excitants, fugitive blisters, etc., are useless, as long as the affection is uncomplicated with enfeebling of vision. The use of concave spectacles should be most rigorously interdicted ; they definitively fix the myopia, and render it incurable. A resort to convex glasses should also be avoided, when there is no complication with amblyopia, and especially when the patient is a young person whose presbytia, before the alteration of the focus of vision, was not excessive. I have never observed a complication with sanguinous congestion; nor do I remember to have observed cases of presbytia suddenly changed into myopia, either by acute maladies or by other causes. Tumors developed in the orbit and the sinuses, might change presbytia to myopia ; which may also serve to explain the faculty of the eye of adjusting itself to various distances.

### § XXVI. *c.* SPONTANEOUS RETURN OF THE ABILITY TO WORK WITHOUT CONVEX GLASSES, AFTER HAVING WORN THEM.

This variety of acquired myopia appears to me to furnish an explanation of a curious phenomenon which has been mentioned by several authors.

It sometimes happens that presbytic persons, who have for a long time employed convex glasses, have recovered the power of reading and writing without spectacles at an advanced age. The fact is reported by several authors, and I have myself more than once observed it.

No one has ever offered an explanation of this fact. Those who have mentioned it, have regarded it as a physiological phenomenon, depending on a return of the lost faculty of accommodation, or on a spontaneous change of the visual focus. All I have seen of it compels me to believe, on the contrary, that it is a pathological symptom, viz., a shortening of the visual focus produced by the use of too strong convex spectacles. That which takes place in these cases, is, in my opinion, this: persons who have worn convex glasses of a considerable power for a long time, are obliged, not only during their use and when they dispense with them for their work, to bring objects near, but also, in many cases, as we have shown in a preceding section, are compelled to use concave glasses for seeing at a distance, because the compass of their vision for distant objects has insensibly and often very much diminished. They have thus become to a certain degree myopic. It even happens, when the spectacles have been very powerful, that this species of acquired myopia becomes more marked and even sensible for short distances, and that the patients begin to be able to read without spectacles, *but on the condition of bringing objects very near the eyes;* a circumstance which appears to have escaped the notice of those authors who have spoken of this affection, but which I have invariably found in all the observations which I have been able to make. Yet further: at the end of some time, or, at times, even from the beginning, the persons in question remark

that they see less well at a distance than formerly, and that they need to recur to concave glasses to enable them clearly to distinguish remote objects. The last case of this nature, which I have seen, and of which I have taken exact notes, will serve to exhibit all the circumstances which I have mentioned.

A lady of about sixty years, having read and written much during all her life, had for some time worn convex glasses. Having employed a somewhat powerful number in the very commencement, she soon came to use No. 12 habitually; when, about six months since, she perceived that she could read without spectacles by placing the book at about six inches from her eyes; but, about the same time, she felt the necessity of employing spectacles for seeing at a distance, which I found on inspection to be No. 14, *concave.* This patient, who has a lenticular cataract, almost complete, in the left eye, has lately perceived a commencement of opacity of the right crystalline, which, in clouding her vision, renders it impossible to read with the naked eye, and forces her again to have recourse to spectacles. This time, her choice fell upon No. 48, convex, with the aid of which she could read fluently. But, to her great regret, this faculty was again lost some months since. I was consulted, at the end of September, 1845, and found that Madame R. could recognize a moderately large print, with No. 24, convex, and could read it somewhat readily with No. 20 or 18. The successive changes in the vision of

this lady appear to us perfectly to explain the phenomenon which is the object of our attention. The use of too strong spectacles, (No. 12,) by forcing her to bring objects too near, had produced a certain degree of acquired myopia, conclusively proved by the necessity which was created for the use of No. 14, concave, for seeing at a distance; which last circumstance must have augmented the myopia, if it did not render it definitively fixed. Thanks to this myopia, the patient began to read without spectacles, but not, it is important to observe, at the same distance which had been habitual to her before the use of spectacles for presbytia. On the contrary, she was forced to bring objects nearer, as is done by myopes. A cataract commences: the vision becomes clouded; as usual in commencing cataract, convex spectacles restored a part of its clearness. Being dishabituated to the glasses No. 12, to which she had artificially adjusted her sight, she could find assistance for some time from No. 48, the refractive power of which was more in proportion to the primitive focus of her vision. With the progress of the cataract, however, the number of the glasses must be lowered: the patient not having gradually done this, and having renounced reading for some time, was forced, some months after, to substitute No. 20 or No. 18. That which is most remarkable in this observation, and which fully proves that the explanation I have given of the return of vision to the naked eye is well founded, is, that Madame R., notwithstanding the

use of these very strong convex glasses, cannot see at a distance, except with No. 14, concave, a number which she will not probably be able to lay aside.

Until contrary proof, then, it is, for me, a settled point, that the presbytic, having been a long time accustomed to the use of convex spectacles, can only dispense with them when they have become more or less myopic, either by the use of too powerful numbers, or by the habit of bringing objects too near, or, finally, from having employed convex or concave glasses *mal a propos* in order to see distant objects with more distinctness.

END OF THE FIRST PART

# PART II.

## § XXVII. SECOND VARIETY OF ACQUIRED MYOPIA.

*Acquired Myopia complicated with Amblyopia.* This variety supervenes in individuals whose sight has been greatly fatigued by assiduous employment, and by placing objects too near the eyes. When this takes place towards the age of puberty, when the body and its organs have not yet acquired their complete development, the consequences of this amblyopia are particularly lamentable. It does not essentially differ from the preceding variety; only, as the focus of vision has been more abruptly perverted, myopia is more rapidly developed, and arrives at a higher degree. For the same reason it is accompanied by an amblyopia the character of which is ordinarily asthenic, but which may sometimes present symptoms of congestive cerebro-ocular irritation. The patient, however presbytic he may previously have been, perceives that his sight shortens, and generally less slowly than in the preceding variety: at the same time, he observes that it is more and more weakened. He can no longer employ his eyes for a long time without experiencing fatigue, which sometimes increases to absolute pain. The

sensation of painful pressure, mentioned as a symptom of kopiopia, by MM. Bonnet and Petrequin, appears to me to belong principally to acquired myopia with amblyopia, and to certain other varieties of kopiopia, rather than to presbytic amblyopia, in which it is very rare, according to the observations I have hitherto made. To recapitulate the characteristics of this affection, vision has no longer the same clearness, neither at hand nor at a distance; during work, the patient sometimes sees the appearance of a dark veil or a thick cloud interposing between him and the objects of his occupation; he is forced, from time to time, to interrupt his employment to allow his sight an opportunity to repose and to return to its normal state; which only takes place slowly, and after a lapse of time so much the more long as the affection is of long date and its symptoms marked. He no longer distinguishes large objects as far off, nor with equal precision. When he looks at a distance for some time, he experiences a fatigue which was previously unknown, and which, after a certain duration of the affection, supervenes more and more speedily. It is probable that the malady presents more or less of the symptoms of presbytic amblyopia at its commencement, but they are not recognized by the patient, and consequently pass unperceived.

Everything leads me to believe that if the physician was consulted in the first period, this myopia might be cured by the treatment we have recommended for presbytic amblyopia. Some-

times even, the affection is a sequel of this amblyopia which has presented all its proper characteristics. The presbytia transforms itself, little by little, into myopia, by the efforts the patient makes to accommodate his sight to the distance at which he is forced to place objects during his occupations. The amblyopia persists with its most marked symptoms. It is thus that one of the varieties of that which has been named kopiopia, and regarded as the exclusive appanage of myopes, is formed. When the patient comes to claim the succor of our art, — at least, it has been thus with all those I have had occasion to observe and to treat, — he already can see no better for work after reposing his eyes and placing objects at a greater distance, nor with the aid of convex glasses. Already his vision is better at a distance when he makes use of concave glasses, by the aid of which he can even read by placing the book at a greater distance than that at which he reads with the naked eye. This is readily explained. Most patients, before applying to a physician, and particularly to the skilful specialist, have already allowed a considerable time to elapse, continuing their employments with insufficient interruptions, bringing objects nearer and nearer, and finally, which may be regarded as the most efficacious and deplorable cause, making use of convex spectacles. These spectacles, by placing an almost absolute obstacle to the exercise of the adjusting faculty, fix invariably the visual focus, and definitively confirm the change of presbytia into myopia.

After what we have said, it may be conceived that between simple acquired myopia, myopia complicated with amblyopia, and presbytic amblyopia, a number of intermediate shades may be encountered in practice, difficult and useless to describe, but which will be easily detected and happily treated by the skilful practitioner. At bottom, all these affections may be regarded as essentially identical. Presbytic amblyopia is their first degree; their highest development, followed by a permanent alteration of the focus, is acquired myopia complicated with amblyopia. The important point which distinguishes them in a practical sense, is, that the aid of glasses, useful in one of these affections, would be pernicious in the other. In presbytic amblyopia, convex spectacles are advantageous and often necessary. In simple acquired myopia, the patient can ordinarily, if not entirely reëstablish, at least considerably lengthen the focus of his vision; he therefore ought, at first, completely to abstain from the use of concave glasses. With the progress of age, he might even sometimes have need to recur anew to convex spectacles. If, after a longer continuance of the affection, he cannot dispense with concave glasses, he ought at least to choose them as feeble as possible. When the patient, afflicted with acquired amblyopic myopia is cured of the amblyopia, I have always hitherto noticed that he remained myopic, and could not exercise his vision at a distance without concave glasses.

*Treatment.* It is always extremely difficult. In all cases, amblyopia is very dangerous. If the succor of our art is not opportunely sought, it may persist, or even terminate in complete and incurable amaurosis. It is necessary, in the first place, to treat it by complete and prolonged interdiction of employment.

It is not rare to see this affection accompanied by congestive cerebro-ocular irritation. In this case, a moderate antiphlogistic derivation should be made without hesitation, and should be proportionate to the degree of intensity of the phenomena. This indication may be carried out by applications of a small number of leeches to the anus and the lower extremities, repeated according to need; by a small bleeding from the foot, if the congestion is greater; by purgatives, irritating pediluvia, sinapisms, and dry cupping upon the lower extremities and the lumbar region; by cold fomentations upon the eyes and head, and, finally, by a mild and unstimulating diet. As long as the congestion does not yield, this treatment should be continued. Sometimes the practitioner will be constrained to unite with it the local and general use of mercurials, with that of preparations of belladonna; for the forced occupation and the constant exercise of the faculty of accommodation which produce the malady, may sometimes give rise to a sub-inflammation or a veritable chronic inflammation of the retina. Too early recourse to exciting liniments and blisters in the neighborhood of the affected organ, should particularly be

avoided. It is better, towards the decline of the irritation, to place a large blister between the shoulders, and afterwards transfer it to the back of the neck. Afterwards smaller ones may be successively placed higher upon the neck and behind the ears : preparation is thus made for a transition to exciting liniments employed in frictions in the vicinity of the eyes, and to flying blisters on the forehead, temples, and cheek-bones.

If work should be forbidden, on the other hand exercise of vision upon large distant objects and especially in the open air should be enjoined, as in presbytic amblyopia ; but the patient should be directed to interrupt it very frequently, and to direct his sight often to large objects at less distances, in order that this sort of rectification of vision may never produce a sensation of fatigue. It should not be forgotten that, contrary to what exists in presbytic amblyopia, the sight experiences lassitude and fatigue, even when the objects on which it is directed are at a distance. All spectacles whatever, convex or concave, should be interdicted : reading, writing, and all similar employments forbidden. It will only be after the complete disappearance of the symptoms of amblyopia that the patient may be permitted to read, write, or follow any analogous occupation, and always with the precaution to place objects at a long distance, and to rest after working for a single minute. These exercises will be prolonged and successively multiplied, as long as the patient feels no fatigue, nor even a presentiment of lassi-

tude, in the organ of vision. This treatment generally cures the amblyopia even when this already approaches near to amaurosis. The myopia, on the contrary, I have always seen persist; but, the more the patient is docile and persevering in following the treatment, the more it will be sensibly diminished. He, who, at first, solicited concave glasses for reading, may even guide himself without spectacles, and see at a distance with glasses much feebler than he had been accustomed to make use of. I have never seen any person attacked with this affection become again presbytic. A few years since, one of the best students of the Faculty of Paris, son of Doctor C., a distinguished practitioner of this capital, was treated by me for a similar affection, which had already arrived at the degree of commencing amaurosis. This young man, primitively very presbytic, of irreproachable conduct, and who had never exposed himself to the action of any debilitating influence, had devoted himself with ardor to scientific pursuits, at an age when the development of the body still required relaxation, and especially exercise in the open air. Assiduously occupied in studies, at home and in the amphitheatre, he at length felt his sight shortened and very much enfeebled. He then came to consult me. The myopia, which he had already contracted, had forced him to use somewhat strong concave glasses, and the incipient congestive amaurosis, which began to complicate the first affection, yielded very slowly. The myopia diminished, but

was not destroyed ; at length, however, he could work without spectacles, and with as much assiduity as formerly, and could see at a distance with much feebler glasses. For four years, since he recommenced study during from eight to twelve hours a day, during which time success in *concours* has several times crowned his efforts, his sight has never been troubled or fatigued.

There remains one obscure point in the study of acquired myopia, which, perhaps from its nature, has escaped observation. It is, to decide when a person yet remains presbytic, and when he has become veritably myope. The successive transformations of the range of vision are so insensible, that the solution of the question is sometimes very difficult. However, there are certain propositions which experience and the analysis of facts permit us to lay down without fear of error. Whenever a person, who is accustomed to read or to work at a somewhat short distance, can continue his occupations after having removed the objects by insensible degrees to a considerable distance, and does not, in consequence, experience fatigue or indistinctness of vision, there is strong presumption of acquired myopia. This probability becomes almost a certainty, when, after having read for some time at a greater distance than is habitual to him, the supposed myope can read with feeble or moderately strong convex glasses at the same distance or at a distance a little less than with the naked eye, and without objects appearing to him to be considerably magnified. This cer-

tainty is augmented when the patient can prolong his work without fatigue, with the aid of feeble convex glasses, much more than with the naked eye. The person must then be regarded as having been primitively presbytic; there is even, in some cases, hope of a restoration of the primitive compass of vision, or, at least, of a range nearly approaching to it, notwithstanding the use of concave spectacles.

We have already said, in § XXV. *b*, that patients, in consequence of the use of too strong convex glasses, may shorten the sight to such a degree as to be able, at last, to read without spectacles, but at a less distance than that which was natural to them before the employment of these optical means. We add, that persons who wear strong convex glasses, acquire the habit of bringing objects very near, when they momentarily lay aside their glasses. We may say, in general terms, however paradoxical it may appear, that convex glasses induce myopia, and that consequently they should doubly be avoided, especially by young persons affected with the species of presbytic amblyopia which may be regarded as the first degree of congenital amblyopia with presbytia. This leads us to add a few words to our remarks upon this affection. But, to finish the subject on which we are treating, we recommend extreme reserve in according strong convex glasses to persons who are still young, who, after having worn them during part of the day, would be obliged to finish their task by removing their

glasses and bringing objects very much nearer. This circumstance is troublesome; it would end in giving them an acquired myopia, especially that complicated with amblyopia, which is of the worst kind.

In treating of congenital amblyopia with presbytia, we have already noted that this affection is easily confounded with simple myopia, especially when the patient, from having brought objects too near, or employed very strong convex glasses, has already shortened the compass of his vision. After a more or less prolonged action of these causes, congenital presbytia may transform itself into myopia. Nothing is then more difficult than to form a precise diagnosis and determine the treatment, particularly when the patient has long employed concave glasses. Perhaps even, after having suffered this transformation, the affection is absolutely incurable without myotomy. Among the cases of kopiopia operated successfully by myotomy, there appear to be a certain number of this nature. It is in congenital presbytic amblyopia complicated with acquired myopia, that this operation appears to me to be indicated, and to promise the most brilliant results.

### § XXVII½. CONGENITAL OR NON-ACQUIRED MYOPIA. DEGREES AND VARIETIES OF MYOPIA.

We have already shown (§ IV.) how difficult it is exactly to determine the visual range which ought to characterize myopia, and to deduce from

it an exact definition of this ocular affection. We have designated the signs by which it may be recognized, and among the number, in addition to the necessity of bringing objects more or less near in order to distinguish them clearly, we have mentioned the faculty of seeing much better at a distance with concave glasses. We have also placed among them, the impossibility of using strong convex glasses for reading and work, without bringing the eyes very close to the book or paper, and without the letters appearing much magnified. We here add a new practical criterion, which consists in an easily performed experiment. We commence by causing the individual who is the subject of the experiment, to read without spectacles at the extreme limit of his distinct vision; then rather strong concave glasses, about from No. 13 to 9, are given to him, and the exercise is repeated, the book being placed at the same distance. If he is presbytic, he cannot read at all; if he is myope, he will see distinctly; vision will also be tolerably clear if the book is brought nearer, and much more distinct if it is placed further off.

Generally, myopia is easily recognized, merely from the mien of the subject, from his manner of reading and working; however, doubtful cases not being very rare, the tests we have just indicated may sometimes become indispensable. In fact, the degrees of this affection being infinitely varied, it is not surprising that at the foot of the scale, that is to say, in its least marked degree, it

should seem to confound itself with presbytia, which sometimes renders the diagnosis very embarrassing. At its highest development, on the contrary, it may sometimes border upon amblyopia. Nevertheless, it is very rarely that this form is presented at the commencement ; it is almost always caused by an abuse, an ill-judged employment of the visual organs, through negligence in the observation of the special hygienic rules. Between these two extreme points are found a great number of intermediate degrees and varieties, to specify which is useless and even impossible ; and yet the practitioner should be able to distinguish them. Among these varieties, there is one, which, to my knowledge, has never been described, and which it is important not to neglect ; its characters are as follows : myopia is not always equally sensible for different distances ; thus there are individuals who can distinguish small objects at a relatively considerable distance. Let us now suppose that much larger objects are placed at distances proportioned to their size, double, quadruple, etc., if they are twice or four times as large, which would seem to place the visual organ in analogous conditions ; the same individual who saw a small object distinctly at a considerable distance, — who, for instance, read fluently at a distance of a foot or a foot and a half, — becomes unable to see a tree or a house when they are far off, but yet visible for moderately long-sighted persons. This peculiarity, of which the importance should be felt, and which certainly merits that some

special consideration should be devoted to it, has many times attracted my attention towards myself as well as others: it was anew directed to it some months since by M. Kerst, professor at the hospital of instruction at Utrecht, an attentive and skilful observer. M. Cunier had the kindness to communicate to me the contents of a letter from this physician, dated March 9th, 1845, from which I quote that which follows: "In passing the pupils of our school under inspection, I have three times found individuals who read with fluency an ordinary print at a distance of 15 or even 20 inches, but who, notwithstanding, do not see large objects at a distance of 12 or 20 feet, who, for instance, cannot read white letters of 3 or 4 inches in height, drawn upon a blackboard placed at this distance. Is not this a species of myopia, though I have found no mention of it in any of the treatises on ophthalmology?" The answer to this question must be in the affirmative: it is certainly a variety of myopia, and one too which is not very rare. I recognize in it a moderate degree of the affection, which has been checked in its development, and which has even retrograded, by the frequent accommodation of the sight to distant objects, but within too narrow limits and with too much uniformity. Let me explain: the power of adjustment to different distances exists on so grand a scale, — on the other hand, it may be so easily vitiated when exclusively applied to certain distances, or to objects of small dimensions, — that it is not enough simply to exercise it; it is neces-

sary to have much variety in the volume of the things looked at, and in the distances at which they are situated. To take an example: towards a certain epoch of his life, a myope reads an ordinary print at a distance of 6 or 8 inches, and, if obliged to habituate himself gradually to remove his book further off, he can at length, with the progress of age, read at double or even more than double that distance; but he reads and writes too much, and does not sufficiently exercise his sight upon large distant objects. We will suppose that the compass of his eyes was from 9 to 12 feet for large objects, and from 6 to 9 feet for those of moderate size, as for large figures on the face of a clock; whatever may be his assiduity in placing his books or paper at a distance as he works, whatever may be the extent to which he has lengthened the visual focus for reading, he will not proportionally augment the length of his sight for other than his habitual occupations; he will not see the clock face much further off, nor perceive more clearly larger and more distant objects: after all which he has gained for reading, he will not have made any advance in other respects. If he wishes to make progress in other directions also, he must pursue means specially directed to this end; and after long and daily exercises upon distant large objects, continued for years, he may be assured of success. He will distinguish objects further off, and will see them more clearly when they are placed in the positions they occupied in his former experiments. I can

myself confirm the opinions I have given. During more than a quarter of a century I have obliged myself, with continual perseverance, to place the books I read, and the paper on which I wrote, at the greatest possible distances; I have thus doubled my range of vision for the employments of the study, and, as I have before said, I might from appearances be taken for a presbyte in these respects. But when I seek to perceive large distant objects, or even individuals placed at the distance of twelve feet or less, I remain at the same point as formerly, and every one may readily recognize that I am myope, from my manner of looking at and saluting them. There is, then, an immense difference between the results of accommodation for small objects at moderate distances, and for those which are larger but more remote. The disproportion between these results is so much the greater, that there are myopes who primitively see small objects further off, others who see best those of larger dimensions, according to the infinite varieties of myopia, which render its definition extremely difficult.

This difference in the compass of vision, — regard being had to the conditions we have specified, — difference which we have considered as belonging to a myopia which is unchanged for distant objects, and more or less diminished for near objects, may also arise, in certain cases, from an acquired myopia. Thus, a young presbyope, devoted to study, ceases to exercise his sight at a distance and applies it too assiduously to reading,

writing, or drawing, but he takes care not to bring objects too near : soon, his sight shortens in regard to distant objects and he can no longer recognize them as far off as formerly. At the same time it becomes shorter for work, but in a much less sensible degree, so that he will scarcely perceive the alteration except when he desires to look at a distance.

Whatever may be the origin of this variety of short sight, it is proper to combat it like a veritable myopia, by the cessation or the temporary diminution of work, and by the more frequent exercise of sight upon large distant objects. It is especially of extreme importance to oppose, as long as possible, the desire which such individuals have to wear concave glasses, and when their will can no longer be controlled, to accord to them only a feeble number, with the injunction to employ them as rarely as possible. The continued use of spectacles for seeing at a distance shortens the range of the visual organs, not only for long distances, but also for work.

That which we have said proves anew the important place which the adjusting power occupies in physiological optics, how necessary it is that the physician should make it a serious study, and that every one should rationally exercise it. It has equally been demonstrated that it is not sufficient to place objects, in working, at a greater distance, in order to diminish myopia, but that long walks and the action of observing voluminous and distant things are also necessary. Children,

especially those affected with myopia, should be habituated to describe the details of edifices situated at a distance, and taught to recognize trees, hills, etc., or even moving objects, as men, animals in motion, and flying birds. They should play at nine-pins, and accustom themselves to throw projectiles towards a mark, by the hand, the bow, or the cross-bow; all of them exercises unfortunately little in favor with teachers and directors of schools. Nevertheless, we have no fear in saying that they are of much greater weight in the balance, as regards the future welfare of the present generation, than a few phrases of Latin, very frequently modern, printed from worn type, with pale ink, upon gray paper. It would be impossible to imagine anything more pernicious for the sight than our present system of education. The ancients were far wiser than we in the instruction of youth, and in their habit of walking whilst pursuing their studies in riper years. To all the excellent reasons by which they were guided, we may add the following: nothing is more salutary than to frequently relax the sight during intervals of reading, and to exercise the faculty of accommodation upon voluminous objects placed at a distance. Therefore, when students consult us, either for fatigue of the sight, or for stationary or increasing myopia, we constantly prescribe that they should pursue part of their studies in one of the great public gardens of Paris. We advise them to walk there, book in hand, slowly; for reading during a rapid walk, or in a carriage,

greatly fatigues the eyes; and we counsel them frequently to interrupt their studies, in order to look at a distance. If it be only in their chamber, such a perambulation is useful, and the intervals may be advantageously filled by meditation on the subject of study, by its recapitulation, and by committing to memory.

## § XXVIII. MYOPIA SYMPTOMATIC OF OCULAR DISEASE.

The vulgar, and many physicians, believe that myopia always discloses itself by a particular conformation of the eye, and by other signs, which in reality only exist in a certain number of subjects. Thus, sometimes the globe is larger and more prominent; sometimes the cornea only is more convex and projecting, whence it follows that the anterior chamber appears larger. It is also worthy of notice, that short-sightedness is most frequent in persons who have a dark-colored iris. Ordinarily the pupil is smaller than in presbytia. But, in the great majority of cases, this affection cannot be detected from any exterior sign. Sometimes persons are met with, who, from their very convex, very large globes, would be thought myope to a greater or less degree, and one is surprised to learn that they are presbytic. Others, on the contrary, have short sight, notwithstanding small globes and a flattened cornea, which are usually found only among the presbytic. It is thus evident that myopia is far from being

constantly betrayed by its exterior aspect. This explains itself very naturally when we reflect that the volume and prominence of the eye may be compensated by a less density and quantity of the refractive media. Among patients affected with hydrophthalmia, do we not see some who are myopic, others presbytic?

When the prominence and the volume of the eye are very considerable in myopia, this affection, far from being produced by a simple aberration from the normal conformation, is usually the result of a veritable pathological state.

In these cases there may exist a certain degree of hydrophthalmia, nearly always congenital, but susceptible of augmentation, and which is recognizable by the following signs: the entire globe is more voluminous, the cornea larger and more convex, the iris trembles slightly during the movements of the eye. When the globe is pressed the pupil is displaced towards the side opposite to the pressure. If, for instance, the finger depresses the upper and external part of the globe, the external superior margin of the pupil becomes irregular; it is displaced downwards and inwards, and the pupil becomes oval or diagonally ellipsoïd, upwards and inwards, downwards and outwards. It is evident that the whole interior is too full, and that there is an augmentation of the quantity of the refracting media, particularly of the aqueous humor. This congenital affection sometimes presents chances of cure; in others, it remains stationary. Very powerful concave glasses increase

the range of vision, but usually only in a very slight degree. The patients should by all means be prevented from assuming too strong glasses, which could only serve to augment the myopia. When not congenital, this hydrophthalmia sometimes depends on a certain degree of phlegmasia, particularly in the membrane of Jacob. In this case, we may hope to cure the malady, or to arrest its march, by a moderate antiphlogistic treatment, conjoined with the external and internal use of mercurials, diuretics and revulsives.

Myopia may also result from exophthalmia ; in which case, at least according to my observations to the present time, it exists only in one eye. If the affection is yet at its debut when the patient applies to the practitioner, it may be combated according to general rules. But I have several times seen an exophthalmia, without doubt congenital and depending on an excessive development of the cellulo-adipose tissue of the orbit of one side, give rise to this uniocular myopia in aged individuals, who had allowed it to arrive at a very high degree by neglecting to employ any curative means.

This affection, which can only be attributed to an aberration of the first formation, or to a malady contracted during the intra-uterine period, does not appear to me to be curable. At least, for my own part, I have not believed it rational to employ any treatment; for the persons in whom I have had occasion to observe it, were all about the age of forty, an age at which such maladies

usually resist every species of medication. They had, furthermore, so much neglected the affected eye, that nothing could be reasonably hoped for from the exercise of the organ. In young children, I should endeavor, by appropriate means, to produce atrophy of a part of the cellulo-adipose cushion of the orbit. To this end, I should employ repeated purgatives, small abstractions of blood periodically repeated, feeble doses of mercurial preparations as alteratives, and especially iodine internally and externally. [See my article on this species of exophthalmia, etc., in the *Bulletin Therapeutique*, February, 1846.] Use should also be made of the auxiliary hygienic means which we shall describe in treating of the unequal compass of the two eyes and of the manner of remedying it. As to compression, it would be absurd to dream of it, at least except as an auxiliary and by most prudent gradation.

The diseases we have described as causes of myopia, having usually a slow progress, produce it only insensibly. As to those which have been recorded as suddenly producing it in persons who were not previously affected, it is extremely probable that the same is true of them as of the sudden development of presbytia, (vide § XII.) Everything leads me to presume that here, also, the affection preëxisted in a certain degree, and that the instantaneous change consisted solely in a considerable augmentation of the myopia. Thus it is not very rare to encounter individuals who assert that they suddenly became myopes in conse-

quence of cerebral congestion. Theoretically, we can conceive such an interversion of the visual focus by the effect of the too abundant afflux of blood into the globe, of which the convexity, the volume and the density would experience a notable modification. I have among my notes, one single observation, taken, in 1834, upon an individual of 22 years. This young man, a student in pharmacy, had a large head and short neck; he was small, thick-set, and subject to cerebral congestions. As he was preparing Opodeldoc, a large quantity of this medicine entered his eyes, and excited conjunctivitis with cerebro-ocular congestion. This condition only yielded to a somewhat protracted derivative antiphlogistic treatment. — The patient, presbyte of the left eye and myope of the right, assured me that the myopia had only commenced in the latter at the age of 16. He stated that, in consequence of great fatigues, he had at this time experienced a cerebral congestion, stronger upon the right side, and characterized by head-aches and dizziness. After an energetic antiphlogistic treatment, the congestion slowly departed, but the myopia remained. In fact, examination confirmed the statement that the left eye was presbytic, and the right myopic. But what proof is there that the myopia, though it had been unperceived, did not exist in a certain degree before this first congestion? The afflux of blood may have been but the fortuitous cause which fixed the attention upon the difference of focus in the right eye, or which at most concurred

to increase the congenital difference. At all events, since I do not possess the necessary elements for more positively resolving this question, as well as that considered in § XV., I must suspend my judgment till better informed.

## § XXIX. RULES OF OCULAR HYGIENE TO BE OBSERVED BY MYOPES.

Congenital myopia exists less often in a very advanced degree than in the state of simple predisposition or slight commencement. Although the contrary opinion has been sustained in works on physics and optics, experience proves that congenital myopia generally diminishes with the progress of age, if nothing has been done to augment it; if, instead of impeding the action of physiological laws, their natural evolutions have been seconded. To obtain this favorable result, the myope should continually exercise the faculty of accommodation, by removing as far off as possible the objects on which he habitually works. He should take special care not to fix his eyes too long on objects of small volume, nor to read too fine characters, whether printed or written. These negative precautions do not suffice; it is further necessary that he exercise his sight very often upon large distant objects, that he postpone as long as possible the use of spectacles, and that he should choose a feeble number, sufficient to give a little more clearness to objects, without lessening their size or bringing them nearer. Even then,

he should only employ them in cases of absolute necessity, exclusively for seeing at a distance, and not for reading or writing. If the myopia is excessive, he should not neglect to lay them aside, at least whilst he reads and writes, and also when he is in the house or in places where he can guide himself without difficulty. If the nature of his occupations and the degree of myopia make their use entirely indispensable, he should take one of the feeblest numbers, and much more feeble than those he uses for seeing at a distance. It is often necessary to accord concave glasses to very young persons, that they may be able to read music and follow demonstrations made upon a black-board in schools and public lectures. It is very important that the number of these glasses should be just sufficient to permit vision at the wished-for distance, and that their use should be restricted to the circumstances designated. It would, however, be better to dispense with them, and to obtain by frequent exercise a gradual augmentation of the compass of vision. It is common to hear absolute necessity alleged by myopes to justify the use of concave glasses during work. According to them, it would be impossible for them to see at the distance required by their occupations without the succor of these optical appliances. Too implicit reliance should not be placed on their complaints, as being well-founded. When they make a resolution, supported by a firm and patient will, they generally succeed in accomplishing their object. If they are occupied in

writing, which fatigues the chest by causing them to stoop, they may procure at a small cost a movable stand, upon which they may write in the erect posture. As this desk may be raised or lowered at will, nothing is easier than to adjust it to the focus of vision, so that there shall be no necessity for inclining the head. If its slide is made with notches at short distances, a means is provided for augmenting the visual distance to a slight extent every week or fortnight, and thus gradually lengthening the compass of the eyes. If the patient is a young lady who complains that she cannot decipher her music at the piano without inclining the bust too far forward, and taking an attitude which hinders her movements, is painful, and may at length become injurious, it will be advisable to adapt to the piano a stand which slides forward and backward, which will allow it to be brought within any distance of the eyes. The sight may be gradually lengthened by pushing back this stand, little by little, were it only a twentieth of an inch each week. These stands may now be procured at the manufactories of pianos. These are general rules, and the exceptions, not at all numerous, will become more and more rare if myopes are taught first to exercise their sight at a distance, and not to assume spectacles too soon, or of too high a number. When the myopia is considerable, it is impossible to dispense with wearing spectacles while pursuing occupations. If the individuals are very young, it is better to adjourn such employments until fre-

quent exercises have more or less diminished the myopia. If this adjournment is impossible, feeble spectacles only should be accorded, as No. 24 to 18, or of the power strictly necessary for the required employment. The occupation should be frequently interrupted, and it should be recommended that in the intervals of repose the spectacles should be laid aside for a few instants, and the eyes turned towards distant objects. In this way, we shall succeed in maintaining the power of accommodation to distances, if not in its full extent, at least in a sufficient degree, and the sight will be prevented from declining in power and becoming shorter.

In docile and resolute individuals, the exercises we have indicated, together with others which we shall describe at another moment, may suffice. It is rarely necessary to do anything more than to secure their constant attention, reäwakened by frequent exhortations. For younger persons, certain contrivances, invented some years since, may be a very useful and valuable resource. Ten years since, I caused a sort of desk to be made for one of the princes, by the aid of which, the distance to be maintained during work might be marked, and augmented by degrees in order to gradually diminish the myopia. Since that time, Professor Berthold, of Gotingue, has invented and described a similar but more complicated instrument, to which he has given the name of *myopodi-orthoticon*, or apparatus for correcting myopia. That of the learned professor, and my own, may

become of great utility to persons whose tender age does not allow of their being replaced by the exercise of the will. Generally the aid of such an apparatus, properly employed, is sufficient to increase the compass of vision, especially with the progress of years. But there is one express condition: it is that the patient shall not yet have employed spectacles, or that they shall have been rarely worn and of a feeble number. It is not less indispensable to forbid too frequent handling of other dioptrical instruments, such as magnifying glasses, microscopes, etc.

As we have previously stated, the diminution of myopia with an advance in age is not universally admitted. The opinion which denies it, counts among its partisans one of my masters, the late Rudolphi, professor of physiology of the Faculty of Berlin, a man whose knowledge as well as scientific probity give great authority to his opinion. He found in himself a reason for not believing in this change of sight in myopes. Age, he said, had not at all diminished his myopia. To this reasoning we have but a word to respond. This celebrated man had consecrated a large part of his life to microscopic researches, which very naturally explains why his sight was not lengthened, since the uniformity and assiduity of his occupations did not permit him to exercise the power of adjustment to distances. Another circumstance which I remember is, that he frequently made use of spectacles. If these reasons were not convincing enough, I could offer in opposition to

his opinion the experiments I have made upon many other persons, and especially upon myself. I am congenitally short-sighted to a somewhat marked degree; but as I have already said, by frequently repeated exercises, by my constancy in rarely allowing myself the use of spectacles,—a privation which was often felt in my youth and frequently made me an object for the jests of others,—I have succeeded in giving to my sight double its former compass. I can now read and write at a distance twice as long as I could twenty-five years since. At first sight, a person who saw me read, would think me presbytic, whilst, on the contrary, I am very short-sighted in regard to distant objects. I can only distinguish them clearly with concave glasses from No. 16 to 12, which I use only when I cannot do otherwise. Now that I have successively reached No. 16, I can see with almost all myopic glasses. Presbytic spectacles force me to bring printed characters very near and to employ glasses almost as strong as those used by ordinary persons as magnifying glasses.

Myopes ought, then, to exercise, as much as possible, the faculty of accommodation to distances, on penalty of losing this faculty, and seeing their affection augment more and more. Children, especially, should be forbidden to bring objects too near; they should never be allowed, at an early age, very small playthings, which they are compelled to place close to the eyes. This not only renders them myope, or increases their

myopia whilst they are yet very young, but strabismus has been seen to result from this practice. The visual axes naturally converge when the eyes are fixed upon objects at a very short distance. The more this act is repeated, the more the convergence becomes habitual; and it at length becomes permanent and converted into strabismus. It is thus that this deviation of the visual axes is so easily produced at the age of from four to six years, the time when persons generally begin to teach children their letters. This accident is especially liable to take place when an inequality of focus exists between the two eyes. This is a point to which we propose to return in another chapter.

## § XXX. CHOICE OF SPECTACLES IN MYOPIA.

It is not possible in myopia to commence by spectacles of as feeble power as in presbytia, since the excess of refractive power, which it is required to remedy in the former, is greater than its deficiency in the latter. Thus it is rare that a myope, even at first, can be satisfied with glasses of Nos. intermediate between 96 and 36, or even with Nos. 36 to 24. This would perhaps be oftener the case, if the myopia had not been artificially augmented from the commencement by the nature of the occupations and by the manner of pursuing them. It is almost always between Nos. 24 and 16, or even 14, that the choice must rest; and it is not common to find a myope whose first

selection, if abandoned to himself, will be limited to these numbers. But setting out at 14, the descent should be very gradual to 12, 11, 10 at most ; this last No. should be rarely surpassed or even arrived at. When, in young individuals, the Nos. 12 to 10 are not sufficient, the myopia is almost always symptomatic of a veritable pathological state, either congenital or acquired, similar to those which we have mentioned in the preceding chapter.

When concave glasses are judiciously selected, they ought neither to lessen nor bring objects near, nor produce a too great distinctness of vision, which may sometimes even amount to oxyopia, a name given to a particular condition where the eye is over-excited and dazzled by the clearness with which objects are perceived. Still less should the glasses cause a feeling of annoyance, of pressure, of pain in the eyes, of fatigue after using them for some time, or any other abnormal phenomenon. When the spectacles are laid aside, the sight should not become more confused at short distances than it previously was ; nor ought a species of shade, or badly defined image, representing either the form of the spectacles or their frame, or the objects which have been observed, to remain before the eyes.

It follows, from what we have written, that we are far from approving the tables of succession of concave glasses as they are even at this day arranged, according to the system of opticians. Thus M. Bonnet, (*Traité des sections tendineuses*,

page 226,) following, in this respect, M. Chevaliér, (*Manuel des Myopes*, etc.,) says that the third series of concave glasses, from No. 9 to No 4, is still employed. Mr. Mackenzie repeats nearly the same statement. Unhappily, this is the fact; but far from constituting a rule to be followed, and to be established as a principle, we must consider it as arising from an error, of which the melancholy consequences are easily perceived. For my own part, I can say, that, after having studied this subject during many years with most special attention, I have never seen, not only the Nos. 9 to 4, but even 9 to 7, assiduously employed, without the appearance of unfortunate results, which were positive, however late they were manifested, and which have always compelled me to substitute feebler glasses. Strict observation demonstrates, that young persons who have not passed the age of puberty, and who have never worn spectacles, have no real necessity for as strong or stronger glasses than No. 9. When they do make use of them, it is because they had already employed spectacles disproportioned to the compass of their sight; or that they have had recourse to them too continuously, and without observing the hygienic precepts dictated by reason and experience; or, finally, that when they first made trial of spectacles, those sufficiently feeble were not offered to them, and that, seduced by the great clearness given to objects by the first extremely concave glass which accident or bad advice caused them to essay, they have joyfully seized, and have not been

willing to abandon it. I know no exception, save in some rare cases of a very high degree of congenital myopia; and I hasten to add, that nearly all these cases enter into the category of affections of which myopia is but the symptom. We have already considered them in § XXVIII.

I ought not to omit to mention a very injurious practice, which most frequently escapes the observation of physicians. Many persons, who habitually wear concave spectacles, also carry a glass originally intended to serve in the absence of spectacles, which they did not always carry with them, or did not wish to have the trouble of putting on. But it often happens that these persons, even when provided with their spectacles, place their glass over them, in order to see with yet more clearness. They thus increase the dispersive property of their concave glasses to a very high degree, which is the more hurtful to them in proportion as the No. is lower on the scale, and to the frequency with which they resort to this practice. Whenever we have to do with affections of sight caused by the abuse of this species of spectacles, we must not forget to question the patient in regard to this circumstance. If he replies affirmatively, the simultaneous use of spectacles and the glass must be immediately interdicted, and the No. of both should be of a lower power.

## THE TROUBLESOME CONSEQUENCES PRODUCED IN MYOPES BY THE INFRACTION OF HYGIENIC RULES, AND ESPECIALLY BY THE IRRATIONAL USE OF CONCAVE GLASSES.

### § XXXI. PROGRESSIVE AUGMENTATION OF MYOPIA.

Let us now examine what happens when the myope neglects the hygienic rules which we have just laid down. By bringing objects too near, and consequently accommodating the sight constantly to short distances, the myopia is more and more increased, and finally reaches a very high degree, especially when the patient neglects to relieve the sight at intervals by looking at large distant objects. The myope is then forced to bend the head very low for every kind of work. He only distinguishes the most voluminous objects when he is almost upon them. It is at this moment that he most particularly feels the need of employing spectacles, even when he was not congenitally excessively myopic; in the latter case, he does not wait till this period. It is always true, that at the epoch when the necessity for spectacles is felt, and especially when the myopia has considerably increased in consequence of work upon proximate objects, it is dangerous to the patient to allow him to yield to his desires. At this period of the affection, the physician should oppose the use of spectacles by every means in his power. He should advise repose of the eyes for some time,

walks in the open air, frequent fomenting the eyes and their neighborhood with cold water, and the frequent exercise of the eyes upon large distant objects ; all of which the patient will continue to practise after returning to his occupation, especially the last precept, to look often at a distance, to do which, he should frequently interrupt his work. It is only after a certain time that he may assume spectacles, being careful to content himself with numbers which render objects more clear without lessening them or bringing them nearer. This choice is more serious than he thinks ; his future sight depends upon it. It is important to forbid his yielding to his instincts, which seem to him to prove optical means a necessity ; for it is frequently the case that he already carries the germ of amblyopia produced by too assiduous work at too short distances.

It is not to be forgotten, that spectacles generally diminish and end by annihilating the power of accommodation ; they fix the range of vision at a certain distance, from which it cannot vary. It thus results that concave glasses first confirm myopia, then increase it, and increase it the more in proportion as they are stronger. It is sufficient to cite the young conscripts, who, to procure their discharge, exercise themselves in reading with very powerful glasses ; they end by acquiring and preserving for the future a much higher degree of myopia than they naturally had. When spectacles of short focus have been employed it is rare to see myopia diminish with age, especially when the

same number has been employed for seeing at a distance and for working, which renders the unhappy consequences much more marked.

Thus, when concave glasses are constantly worn, the myopia is first confirmed; and the patient is then exposed to see it incessantly augmented. Among their bad effects this is the first, and the point from which commence all the pathological conditions consecutive to the abuse of spectacles. Between the different degrees of alteration of sight which they produce there is no well-defined limitation, and it is not possible to assign a term to the progress of the affection. However, there is a certain gradation in their injurious action. The succession we are about to describe is that generally observed. First let us remark that the effects are more sensible, more prompt, and their succession is more rapid, when the glasses have been perpetually worn; when, instead of reserving them exclusively for seeing at a distance, they are worn also for guidance in walking, and, what is yet more pernicious, when they are not removed, or at least changed for others much more feeble, when reading, writing, and work are to be executed. Far from seeing his vision improved, far from continuing to see as clearly at a distance with a given number, the patient perceives that his myopia increases. He feels a necessity of recurring to stronger concave glasses; but the desire he expresses must not be acceded to; it is an opposite progress which we must endeavor to secure. The best, the only remedy in this cir-

cumstance, is to suspend every kind of work, as well as the use of spectacles, for one or several months. The patient should furthermore exercise his sight at a distance during long and frequent walks, and if he has some indispensable occupations, he should pursue them with the naked eye, and observe, at the same time, the hygienic rules which we have traced in § XXIX., that is to say, he will work standing, place the objects at a distance, and frequently interrupt his occupation to observe things at a distance, etc.

When it is impossible for the patient to prolong this, at least partial, suspension of work, he will still endeavor to attenuate its injurious influence, first by the observation of the hygienic precautions which we have referred to, and, secondly, by employing spectacles as feeble as possible, and which should always be several numbers less powerful than those he uses for seeing at a distance: even these he will wear as rarely as possible. He should take long walks between the hours of work, during which walks he should look at a distance without spectacles. When obliged to return to his usual employments, a point which we cannot too much insist upon, is, to reduce the power of his glasses to the feeblest number which his eyes and the nature of his occupations will permit.

If, instead of following these counsels based upon experience, none of the rules which we have presented are observed, the myope will see his infirmity, more and more augmented, arrive at last

at its highest degree, and become complicated with other pathological affections.

When arrived at this state, myopia retrogrades with difficulty, even when all the means we have counselled are rigorously employed. Probably ocular myotomy would always be necessary when it had reached this degree. Not only in children, but likewise in adults, strabismus is produced by bringing objects too near, especially when one eye is feebler or more myopic than the other. It is, however, more common to see an augmentation of an already existing strabismus, than to see it actually created by the two causes we have mentioned, greater feebleness or myopia of one of the eyes. If work with the naked eye upon objects in too close proximity is injurious, the use of strong concave glasses is yet more so, especially when they are not laid aside or changed during occupation. The injurious effects of diffusive glasses are not, however, as prompt as those of convex lenses; frequently even, as we shall presently see more in detail, they manifest themselves so late that neither patients, opticians, nor physicians are willing to believe the true cause of this diminution of the visual faculty. Since I believe myself to be the first among physicians and ophthalmologists who has described the majority of the affections of the retina consecutive to the abuse of concave glasses, and since an attentive, reiterated observation has placed them beyond a doubt in my mind, they constitute a point of the highest importance, which I think myself

bound to recommend to the attention of my colleagues. I also most earnestly recommend it to the attention of all those, who, like the opticians, can often prevent by their counsels the deplorable consequences of an ignorance which daily causes the greatest evils.

## § XXXII. MYODOPSIA, CONSIDERED AS ONE OF THE MOST CONSTANT EFFECTS OF THE USE OF TOO STRONG CONCAVE GLASSES.

One of the most constant effects of the use of concave glasses is myodopsia, or muscæ volitantes. It ordinarily precedes the other alterations of vision which we have to notice, and may even supervene without spectacles having been employed, when the myope shortens the focus of his vision by bringing objects too near. It is yet oftener induced by the use of too powerful glasses, and especially when these glasses or even feebler ones are constantly worn, for work as well as for seeing at a distance. This kind of hallucination of vision follows so closely the irrational use of concave glasses, that, when patients come to consult me with spectacles upon their eyes, I never fail to question them in regard to the existence of this neurosis of the retina.

It must not be believed that this effect of concave glasses does not occur when they have a bluish or greenish tint. On the contrary, when they are worn indiscriminately in every degree of light, even on cloudy days and in dimly-lighted

situations, their color favors the morbid consequences in question. But such is the force of prejudice and habit, that it is always extremely difficult to induce patients to abandon this useless tint; the same is true of the habitual use of too concave glasses. Persons who ask advice, respond by arguments which at first appear somewhat specious. Sometimes they assert that it is impossible for them to see, or, at least, to guide themselves and recognize those who pass them, without spectacles; sometimes they allege that the myodopsia did not supervene till recently, and after having worn the spectacles a great number of years, the number not having been changed for a long time. We can understand that a patient must think it singular that at the end of a long period, the action of glasses, of which the No. has not been changed for ten or even for twenty years, can produce a phenomenon like myodopsia, or, as we shall see, amblyopia. This affiliation of the morbid accidents is not the less real, however inexplicable it may at first appear. But, in fact, it is as easily accounted for as many other physical changes which are produced slowly and in a latent manner. It is only after a great number of years, and when their action is, so to speak, accumulated, that they become manifest. I sometimes remind literary persons, who refuse to acknowledge the force of these arguments, of this line of Ovid:

"Gutta cavat lapidem, consumitur annulus usu."

In fact, the influence of concave glasses is not

more sensible during the first years, than is that of the continual fall of drops of water.

This species of myodopsia, which, from its causes and symptoms, cannot be regarded as the effect of an alteration of the refractive media, should be considered analogous to a veritable hallucination of vision; it is moreover without any danger. Its progress is arrested and it diminishes with the myopia, or with the cessation of the causes which have produced it. It may even entirely disappear, when the patient abandons the use of concave glasses. It sometimes suffices, in order that this result may ensue, that he should employ feebler glasses, and only for seeing at a distance; but he must follow the other hygienic rules which we have laid down for myopes. This myodopsia requires no other treatment, except in cases where it is accompanied by cerebro-ocular congestion and conjunctivitis; that is to say, by a congestive irritation of the external and internal membranes of the eye. It then becomes a symptom of a veritable congestive amblyopia. When this is the case, the moving filaments lose, little by little, their essential characteristic, their mobility, and may be at length transformed into veritable scotoma. A derivative antiphlogistic treatment is here indispensable; but most frequently the cure of the amblyopia does not lead to the disappearance, nor even the diminution, of the myodopsia.

## § XXXIII. KOPIOPIA SYMPTOMATIC OF A HIGH DEGREE OF MYOPIA, OR CONSECUTIVE TO THE ABUSE OF CONCAVE GLASSES.

When work at too short a distance, or the improper employment of concave glasses has been longer continued, that degree of weakness of vision supervenes which constitutes the first period of amblyopia, and which has been described by distinguished authors under the name of kopiopia or ocular lassitude. We have already described its symptoms, (§ XIII.) Among these, the sensation of fatigue of vision, and the augmentation of the myopia accompanied by a certain dimness of sight even for small near objects, should be placed in the first rank. This last circumstance, the dimness of vision, should fix the attention of the physician the moment it presents itself, for it is not at all inherent to myopia. On the contrary, one of the distinguishing characteristics of the latter is the faculty of working for a long time, without fatigue, upon small objects. This myopic kopiopia, then, is an affection corresponding to presbytic amblyopia; but with this difference, that the latter may supervene, in excessive presbytia, notwithstanding the strict observation of hygienic rules, whilst kopiopia in myopes only follows their disregard. The presbytic individual is not born to work at limited distances upon minute objects. The myope, on the contrary, who, by incapability of surveying a vast horizon and embracing the

*ensemble* of a beautiful landscape, has been deprived of many pleasures, as a just compensation has received from nature the precious faculty of being able to devote himself to minute occupations; and that without fatigue or serious consequences, provided that he use it with discretion, — that he does not depart from the hygienic laws which she has established for him, — and exercises the power of accommodation, which he enjoys in common with the long-sighted, though in a different degree.

We have merely briefly pointed out the symptoms of this species of kopiopia; but this is sufficient for certainty in its diagnosis. The experienced practitioner will always be able to recognize this affection, even when, as is not rare, it assumes a little different form. Thus, in myopes who have abused very strong concave glasses, were it only for working, we sometimes find the following variation in symptoms. The patient reads very well with his spectacles, but, after prolonged application, a slight dimness of sight comes on, which obliges him to repose. Furthermore, the same glasses are insufficient for seeing at a distance, or at least he perceives the need of stronger glasses for longer distances; but we must take care not to yield to his desire.

Whenever the kopiopia is not accidentally complicated with primary or secondary nervous or sanguineous congestion either of the brain or retina, and whilst it is yet at its *debut*, it is sufficient, for its dissipation, to reëstablish the normal discharge of the functions by the observation of the rules we

have laid down for the treatment of myodopsia. When it presents itself in a more advanced stage we might yet, in most cases, effect a cure by the use of the same means, provided that the patient is in a position to abandon work completely before resorting to them; but this suspension of employment should be for four or six months, and during that time the patient should exercise the sight upon large distant objects illuminated by a mild light. If this treatment is ineffectual, or if the social position of the patient hinders him from pursuing it, there is then an indication for resorting to ocular myotomy. That this operation presents a precious resource in these cases, no longer admits a doubt, after the facts reported by MM. Bonnet, Pétrequin, Cunier, J. Guèrin and others. However, I must say, I am not entirely of the opinion of the first two surgeons I have named; I do not believe that ocular myotomy succeeds as often and as completely as they think. Although convinced that in certain cases of kopiopia, section of the muscles is applicable, I have not yet employed it, because the circumstances where it is really indicated, do not yet appear to me to be clearly defined. In support of this assertion, I might cite several detailed observations of kopiopia which I have in my possession, where myotomy, executed by skilful hands, after having produced a deceptive amelioration of vision, has not prevented the affection from returning, after some time, to such an extent, that the patients have been constrained to seek my advice. I may perhaps hereafter publish

these observations. They appear to me to demonstrate that the longer the operation is postponed, the greater are the chances of success.

If the patient continues to work upon objects at too short distances, and to use spectacles without discrimination, the kopiopia is sooner or later followed by a true amblyopia. This often supervenes even without being preceded by kopiopia, or, at least, without the patient having attached much importance to the latter, or complained of it to the physician. This succession of the two affections sufficiently proves that the first is but a less advanced stage of the second. This proof is corroborated by the manner in which the kopiopia transforms itself into amblyopia, and by the nature of the first affection, of which we subjoin the distinctive characters, having postponed them till the end of this paragraph in order to state them more distinctly.

As long as the kopiopia continues, the patient continues to see clearly in times of repose and at the commencement of his work; but, after pursuing his occupations a certain time, his vision becomes confused and dim. This effect increases in direct proportion to the time he works, and after the lapse of a variable, but often only a short period, the continuance of his occupations becomes entirely impossible. It is otherwise with amblyopia; the dimness of vision is permanent from its very commencement, and exists even during complete repose; but it augments during work and proportionately to its duration, which marks still further

the analogy between presbytic amblyopia and kopiopia. The longer the suspension of work is delayed, the longer the patient prolongs the use of concave glasses even during his occupations, the more their power is great and their use constant, the more the malady makes rapid and considerable progress. We should further observe that the simple habit of bringing objects too near, brings on kopiopia in myopes as well as in the long-sighted; and it finally leads to acquired myopia with amblyopia, — an affection which has been cited as one of the forms of kopiopia. It is otherwise with myopic amblyopia, as we shall see in the following section.

## § XXXIV. MYOPIC AMBLYOPIA AND AMAUROSIS.

This amblyopia is rarely observed except in two circumstances: first, when the patient has used glasses of the same number both for guiding himself and for working.

Beyond its causes and its progress, which we have already described, this affection, exclusive of the myopia and weakness of sight, ordinarily possesses only negative characters; that is to say, the absence of symptoms either of general or local irritation or congestion or of asthenia. Sometimes, however, this nascent amblyopia announces itself by other symptoms: at times, by a slight injection or fugacious pains in the globe, caused by a too vivid impression of light; again, by an excessive nervous sensibility of the eyes, which retain for

some instants the impression of an object, so that the patient seems to perceive it some time after having turned away from it. Furthermore, objects lose more or less of the clearness of their outlines; they present abnormal forms, and this disturbance of the visual faculty does not end when the individual approaches nearer the object. If spectacles were accorded before having combated this amblyopia, its march would infallibly be hastened. This is then an essential point, upon which the physician should fix his attention, and when he has not a positive certainty of the non-existence of this affection, or, if he suspects its imminence, the more he hears the patient complain of the diminution of his sight, especially if the diminution has been rapid, the more he should be cautious not to accord to him the glasses which he so earnestly begs for.

This amblyopia, which results from the sight having been as it were worn out by the action of too strong concave glasses, ordinarily supervenes at a late period, even after the age of forty, in those who have worn glasses from early youth. Often, even, it makes itself felt in persons who for a long time, perhaps twenty years, have not changed the number of their glasses. We may conceive, then, as we have already said in regard to myodopsia, that it becomes very difficult to prove to the patient that these glasses are the real cause of the enfeebling of his sight. The verity of this etiology, however, is not the less undoubted.

About eight years since, I was consulted by a clerk aged nearly seventy. Myopic for half a century, he employed concave glasses. For twenty years he had not changed their number. At the moment when he came to consult me, his sight had gradually decreased during the past year; so much, that finding it impossible to continue his occupations, he at length decided to consult a physician. There existed, in the brain and the retina, no symptoms, neither of congestive or sub-inflammatory irritation, nor of asthenia. I assured him that this amblyopia, already arrived at such a degree that the patient could neither read nor write, and saw very large letters only with great difficulty, had no other cause than the use of much too strong concave glasses, No. 7, constantly worn, even during work. This is the degree which I term advanced amblyopia, and which many physicians name amaurosis. I ordered him to suspend work, to lay aside his spectacles when at home, to exercise his naked eye upon large distant objects; I permitted the use of more feeble glasses only, (12 to 10,) and only during his walks; I prescribed fomentations with cold water to which a little brandy was added, and afterwards an exciting liniment. After several months of this rational treatment, he resumed his accustomed avocations, with spectacles reduced several numbers, and which he accustomed himself to lay aside as often as possible. It is only since the beginning of 1846, that a commencing cataract in the left eye forced him anew to abandon his occu-

pations, the right eye having been affected with cataract for several years.

I have often observed analogous cases, which form a transition between amblyopia and amaurosis, or the first degree of this latter affection ; but this case may serve as a type of the species. It is very rare to see amblyopia so tardy in its manifestation, and followed by so prompt and complete a cure after being developed to such an advanced degree.

We see how high a point this amblyopia may reach; it is natural that when at these its extreme limits, it may transform itself into amaurosis, when the patient, instead of scrupulously avoiding the causes of the evil, and following the indispensable hygienic rules, repose being first of all in its importance, persists in continuing his occupations, and using stronger and stronger glasses. At last the moment arrives when the strongest spectacles, after having ameliorated the sight for some time, no longer produce any effect, and when the blindness, having become complete, generally remains incurable. In these cases, the difficulties of treatment are so much the greater in proportion as the diagnosis becomes more obscure, by the distance from the starting point of the malady, and by the fact that it is no longer possible to determine it by direct experiments with spectacles, which have become impossible. Among the circumstances which augment the difficulties of diagnosis and of the treatment, there is one of the first importance ; it is, that the irri-

tation of the internal membranes of the eye, whether produced by the abuse of spectacles, or accidentally preëxisting with all the complications which may be subjoined, often masks and obscures the primitive and essential phenomena. Nevertheless, after having several times observed this species of optic amblyopia in all the purity of its original form, it may sometimes be recognized under its disguise; some useful directions may be given, and the complication disposed of in its turn. Moreover, this complication of retinal and afterward cerebral congestion supervenes only exceptionally, when the patient is obstinate in continuing his occupations and using spectacles, notwithstanding the fatigue he experiences in doing so. In robust and sanguine individuals, already affected with congestion, the affection may early impose itself for a simple congestive amblyopia. On this account we establish this general rule, that, in every case of weakness of sight, whatever it may be, the actual visual focus and what had been the primitive range should be ascertained. The production of a particular species of amblyopia in myopes, amblyopia which supervenes in consequence of work upon too near objects and the use of too strong spectacles, is a phenomenon so much the more remarkable, because the myope, as we have already observed, contrary to what is true of the presbyte, is naturally well adapted to minute employments, and may follow them without fatigue, on the sole condition of placing objects at a sufficient distance. If he does not bring

objects too near, he experiences nothing analogous to that fatigue and those other symptoms which characterize presbytic amblyopia. The amblyopia, then, is in him primitively congestive, or, at least, the causes which give birth to it are not connected with the focus of vision. In the presbytic, on the contrary, the nature of the range of vision, without congestion or other pathological state, is alone sufficient to produce amblyopia; which may be stated in the form of a proposition. Amblyopia in the presbytic is most frequently optic; it is generally pathologic in myopes.

If the amblyopia of which we have spoken is neglected, and especially if the use of too strong spectacles, particularly during work, is persisted in, it may be transformed into amaurosis. But this is a rare case. Generally the patient who perceives the progress of the disease, suspends the use of spectacles, ceases his work, and the amblyopia remains stationary. This species of amaurosis ordinarily affects a single eye; that which was primitively the most feeble. This is a question which we shall treat of hereafter. There are no other rules to follow than those we have given for amblyopia: repose of the eyes; frequent walks; exercise of sight upon distant objects, but without fatigue; complete suspension of the use of glasses, or, at least, choice of much feebler numbers, and only for seeing at a distance. If the amaurosis is uniocular, the affected eye should be exercised as we shall describe on another page. Whilst these hygienic rules are observed, the amaurosis should

be treated according to its character, which is, in most cases, asthenic. It is rare to find a congestive and sub-inflammatory complication. We should recur to fomentations of cold water, containing a little brandy, to exciting liniments, finally to transitory blisters placed at the commencement of the hairy scalp, over the mastoid processes, upon the forehead, temples and cheek-bones.

This is the place for citing some instances of the amblyopia and the amaurosis of which we have spoken, to illustrate and confirm what we have laid down.

*Obs.* 1. A merchant of about forty years, very short-sighted, had always worn very powerful concave glasses, even for work. Several years since he had reached No. 3, which he constantly wore, even for reading and writing, and for guiding himself about his own house. This habit must have been so much the more pernicious to him, because, at the epoch when he consulted me, he could yet, notwithstanding the advanced state of his disease, employ the eye the least enfeebled, for reading, at the distance of about 15 centimetres, and could read further off in a passable manner with concave glasses No. 6; he could also guide himself without difficulty in his apartments without spectacles. All these circumstances proved that the number of his glasses had been lowered beyond all proportion and without any necessity; which, joined to the probably congenital inequality of the two eyes, should be regarded as

the principal cause of the malady. In the right eye an ancient and almost complete amaurosis existed, with diverging strabismus. The left eye was the seat of an amblyopia, of which the congestive character was complicated by gastralgia and an habitual state of constipation, which appeared to keep up the congestion of the internal ocular membranes. The following was the prescription at the first consultation, at the end of April, 1845:

Feebler glasses will be substituted for No. 3, beginning with No. 3½, and passing to No. 4, 4½, and 5. No. 4½ or 4 may be finally selected for guidance in the street. For going and coming in the interior of the house, for writing and reading, spectacles must be entirely laid aside; or, at the utmost, No. 12 only should be employed for reading and writing.

From time to time a purgative enema; after the first purgative, place eight leeches about the anus.

Make gentle frictions upon the forehead and left temple, morning and evening, with the size of a bean of mercurial ointment; wash the eyes often with cold water.

Take, from time to time, one grain of calomel, every morning during four or five days.

After following this treatment for some time, place temporary blisters upon the forehead, and left temple, and behind the ears.

At the end of three months, I learned that the left eye was cured, and that an amelioration had been obtained in the right eye; I very much

doubt if the benefit, in this eye, has followed a progressive march. Having had no further news of my patient, I am not certain ; but, in such cases, it is the general rule that the patient, delivered from all inquietude for the eye the least and most recently affected, troubles himself no longer about the other, afflicted, as he thinks, for too long a time, and too profoundly, to make it worth while to endeavor to cure it. In this case the amaurosis and the diverging strabismus of the right eye was caused by the circumstance that, primitively more feeble and more myopic, he had neglected it, and, deprived of exercise, it was lost little by little. The visual power of the left eye, on the contrary, had been worn out by the too great power of the glasses, which, in the commencement, produced a retinal irritation, subsequently kept up by other and different causes acting to the same end, viz., constipation and gastralgia.

*Obs.* 2. A village curate, aged 45, very short-sighted, had used, for working as well as for guidance, spectacles of which he had successively reduced the No. to 5. When he came to consult me in May, 1844, he was affected with an amblyopia, strongest in the right eye. I could discover no other causes than the action of his spectacles and the congenital inequality of the two eyes. He was cured by the following means:

Repose of the eyes for some weeks.

Abstain as much as possible from the use of spectacles:

For guidance in familiar places to employ No. 12 instead of No. 5, and not to descend to No. 11 and 10, except in case of absolute necessity.

Spectacles not to be employed for reading or writing. No. 12 may be used for reading when absolutely necessary. The eyes to be often bathed with cold water with a table-spoonful of brandy added to each glass.

Not too nourishing a diet.

Three or four times a day to make gentle frictions on the forehead and temples with a half-spoonful, and afterward a spoonful, of the following liniment:

| | | |
|---|---|---|
| R. | Spirit. Rosmarini | ʒ i |
| | Balsam. Fioraventi | ʒ ss |
| | Spir. Lavandulæ | ℥ ss |

M. ft. Liniment.

Take much exercise in the open air.

After following this treatment for some time, place temporary blisters behind the ears.

The hemorrhoïds are not to be suppressed, but they are not to be augmented by too exciting a regimen. If they become too abundant they may be moderated by some glasses of sulphuric lemonade. If the liniment is well borne, a fourth of a drachm of aq. ammoniæ may be afterward added.

In bright light, wear blue plane glasses.

If the patient had had the leisure to exercise often the right eye by itself, there is no doubt but this eye might have been reëstablished like the other. (See the chapters where we shall treat of the *inequality of compass of the two eyes.*)

A third example merits to be presented, although, in this case, I do not yet know the result of the means I advised. My principal end in reporting it, is to show the action of causes, and to point out the line of conduct to be followed for neutralizing them.

*Obs.* 3. A public functionary, short-sighted from childhood, had worn stronger and stronger concave glasses. For twenty years he had worn No. 4½ even for reading and writing, and he reïnforced it from time to time by a glass of No. 9. The result was an amblyopia much further advanced in the right eye, which was congenitally more myopic, and, at the same time, more feeble.

I was consulted towards the end of Nov., 1846. Long before, a slight cerebro-ocular congestion had existed, of which I now perceived no traces, but which at first might have contributed to the production of this amblyopia. The following were my prescriptions:

Suspend work during a month or two.

At home, and even in the streets, when they are not too crowded, spectacles must be dispensed with. In case of need, No. 8 may be employed. In other circumstances, by exception, and in the beginning only, No. 6 may be worn, but the patient will endeavor to disaccustom himself to them little by little. A glass of the same No. with the spectacles may be used, but never in conjunction with the latter. He must generally stand while reading or writing, and employ only the naked

eye, or, if he cannot dispense with them, he may use, at first, No. 10, and afterward, No. 12.

Whilst working, he must gradually increase the distance of objects. Finally, he should exercise the right eye independently of the other, especially in guiding himself. Use two bottles of the liniment of which the formula has been already given, and afterward two other bottles, directing some of the vapor of the liquid towards the eyes, after each friction; to two other bottles an eighth of a drachm, and afterward a fourth of a drachm, of aquæ ammoniæ are to be added to the prescribed quantity of liniment.

As we have said, the patient has not yet returned to give an account of the effects of the treatment.

In the different varieties of affections produced by the abuse of too strong concave glasses, of which we have treated, we have far from exhausted all which might be said upon this subject. It is but standards which we have wished to set up, between which may be placed intermediate degrees and varieties, the transitions between the different forms; which the physician will easily recognize, and classify, in order to treat them according to their nature.

## COMPLICATIONS OF MYOPIA, BY WHICH IT IS AUGMENTED, EITHER IN REALITY OR IN APPEARANCE.

### § XXXV. OPACITIES OF THE CORNEA.

Cicatrices of the cornea are not an absolute cause of myopia. When they are slight they may sometimes exist in presbytic persons, or even those affected with presbytic amblyopia, without producing any other effect than an inconvenience and dimness of vision. Nevertheless, in most cases, they produce a real or apparent myopia in presbytes, and augment an already existing myopia. We may conceive that a diminution of the transparency of the cornea, by destroying the clearness of the outlines of objects, may insensibly require them to be brought nearer the eyes, and create, after a certain time, a species of acquired myopia. Still more must an already existing myopia be augmented by the presence of cicatrices of the cornea in the two eyes. This effect supervening slowly, the patients only ask advice when it has already arrived at a high degree. When one eye only is the seat of opacity, the result is different. We shall consider it in speaking of inequality of the eyes.

When both eyes are affected with corneal opacity, in order to avoid the supervention of myopia we must not only combat the opacity, by the topical applications which every ophthalmolo-

gist should know, but we must also forewarn the patients against the tendency they have to bring objects nearer. They should be advised to place them as far off as possible, to frequently interrupt their work in order to direct their sight upon distant objects, and, in their walks, assiduously to conform to the last part of this precept. The same course should be followed when the myopia is already completely established; it is by no means always irremediable. The temporary suspension of all kinds of work, the more assiduous exercise of the eyes upon things at a distance, may notably diminish, if not remove, the myopia. The use of concave glasses, on the contrary, singularly accelerates the progress of the malady. They should, therefore, be rigorously abstained from, as long as the myopia is not deemed definitive and incurable; and even when this is the case, the patient should be restrained to the use of the highest numbers, and employ even those only in the most urgent circumstances.

Convex glasses, as in the cases where spots do not exist, can only be useful in cases of incomplete acquired myopia succeeding to presbytia, and in those of congenital presbytic amblyopia simulating myopia. They may also be of use in certain similar uniocular affections of which we shall speak in treating of the inequality of the eyes.

Except in the cases we have named, convex glasses will only produce palliative and transitory effects, by acting as magnifying glasses. They

will only confer a greater clearness of vision at the moment of their employment; a deceptive amelioration, which but leaves behind it a more marked myopia and weakness of vision.

An ambulative optician, one of the most shameless charlatans, made a great noise, some years since, at Paris, Brussels, and elsewhere. He pretended also to cure myopia and opacities by the use of spectacles. It may be supposed in advance, that he obtained any success only when, in his gross empiricism, he by hazard met with some cases like those of which we have spoken. In all others, he completely failed. In one case among others, where he affirmed that he had cured opacities and myopia by this means, the affair was carried before the tribunal of commerce. The patient having called me as a witness, I was compelled to testify that no cure had been effected. Unhappily the public, and even practitioners, are too often dazzled by the dexterous artifices and by the incredible effrontery of individuals of this stamp.

## § XXXVI. MYOPIA COMPLICATED WITH AMBLYOPIA PRODUCED BY CAUSES NOT DEPENDING ON THE COMPASS OF VISION AND THE USE OF SPECTACLES.

The myope, like every one else, may contract amblyopia by non-optical causes; that is to say, an amblyopia where the origin of the affection does not spring from the range of vision, from

its nature, nor from the duration of work, but from a constitutional pathological cause, such as irregularities in the circulation of the blood, an affection of the nervous system, etc. Thus the amblyopia, instead of being optical and retinal, may be either another of the forms of retinal amblyopia, or a cerebral, spinal or ganglionic amblyopia. In all these species of amblyopia, the visual focus, in the myope, shortens more and more, as his vision diminishes. During work, the patient feels the necessity of bringing objects nearer, and sees less far those which are voluminous and distant. The presbyte, on the contrary, when the amblyopia commences, distinguishes small objects better in removing them to greater distances, — a peculiarity which is less injurious to him than the shortening of vision to the myope: for the latter, believing the incipient amblyopia to be but a simple augmentation of his natural infirmity, often tries to remedy it by bringing objects nearer, or taking stronger glasses.

His ignorance leads him to have recourse to these pernicious measures, which increase at the same time the myopia and the amblyopia; further, the spectacles he employs soon become insufficient, and he sees himself forced rapidly to lower their No. He does not deem it necessary to ask the advice of a practitioner, and his affection becomes inveterate and more and more difficult to cure. As a climax of misfortunes, when the patient at last perceives the morbid nature of his weakening of sight, the physician often no longer

knows how to recognize, among all the causes which have concurred to produce the difficulty, which is that which first acted, and the part which should be assigned to each one of them. This demonstrates what scrupulous attention should be given to every amblyopia and amaurosis, to ascertain as exactly as possible the primitive focus of vision.

We cannot too earnestly recommend, in cases of myopia complicated with non-optical amblyopia, the complete suspension of the use of spectacles, the repose of the eyes, moderate exercise of vision upon large objects in a mild light, in a word, the observance of all the rules we have given for myopes in general; which does not supersede the treatment of the malady according to its special character. If the persons are not in comfortable circumstances, and cannot dispense with following their avocations, when the degree of amblyopia is not too advanced, we cannot refuse to permit them to work with moderation. But they must, at least, do so without spectacles, at the greatest possible distance, and with frequent interruptions, during which the sight will be turned to a distance.

## § XXXVII. PROBLEM IN REGARD TO MYOPIA.

In myopia, as well as in presbytia, there remain many points which I cannot perfectly explain to myself, and which I should probably understand much better, if my practical and scientific occupa-

tions left me time to study optics to their ultimate principles. Among these problems I propose one for solution by those who are more learned than I in mathematics and physics.

In March, 1844, I was consulted by a law student aged 21, moderately myope from birth. There was no suspicion of acquired myopia. No species of convex glasses ameliorated his vision. Without spectacles he could prolong his studies as much as he wished, without experiencing any fatigue. Concave glasses from No. 24 to 18, prolonged his visual focus a little. However, neither these glasses held further from the eyes, nor others of a stronger focus, gave any appreciable increase of clearness to his sight. But he presented this singularity: when he held these same glasses, No. 24 to 18, obliquely before his eyes, almost parallel to the surface of the ground, he saw distant objects much more clearly. I was unable to notice any other peculiarity in his eyes, except that they were small and a little soft.

When, by the medium of his half-closed eyelids, a gentle pressure was exercised upon the globe, the pupils were deformed as in commencing hydrophthalmia, as we have described in § XXVIII. The iris was blue.

I could give no other advice to this patient than to counsel him not to employ concave glasses below No. 22 to 18, and to incline them obliquely the least, and the most seldom possible; to exercise his sight in looking at a distance without glasses, and to work with the naked eye, with

short interruptions, and at the longest distance which he found to be possible.

Was this a particular species of myopia? Was there a complication with a certain degree of hydrophthalmia or synchisis? It is easily seen that optical glasses no longer produce their normal effect, when they form an angle with the vertical axis of the eyes, and we recommend to all those who wear them to place them parallel to the plane of the iris. But how can we explain, according to physical laws, this extraordinary effect of the oblique position of the spectacles?

## § XXXVIII. USE OF CONVEX GLASSES IN MYOPIA.

As I have already spoken of the influence, in my judgment hurtful, of convex glasses in myopia, especially if it is accompanied with amblyopia, § XV., I have very little to add upon this subject.

May the use of convex glasses, or at least of a single glass, be accorded to myopes advanced in age, when they can no longer read a small character or writing difficult to decipher?

Generally, a myope who has well regulated his sight will experience no difficulty in reading any character whatever, as long as any other constitutional or local cause has not occasioned an amblyopia. However, we may, I believe, give an affirmative response to the question I have asked, in the three exceptional cases which follow, and which confound themselves in one another by a very gentle transition.

1. When aged and especially feeble myopes experience in the visual faculty, as well as in that of other organs, that gradual wearing out which is the effect of caducity, they may be allowed a glass, for the purpose of reading a print which is more than usually fatiguing, to be moved at a short distance before the lines they read. Nevertheless, this is an occupation which they ought to indulge in as seldom as possible, and they should be careful to look alternately with both eyes. The case we have specified is extremely rare, and an attentive examination will nearly always disclose the existence, or at least the commencement, of another malady of the organ of vision, and will indicate that it is opportune to suspend all occupation, to follow the hygienic rules we have already mentioned so many times, and finally to recur to a tonic or exciting treatment, or one specially directed to one of the pathological affections of the retina, due to ordinary causes, or coming on in consequence of badly regulated myopia or the abuse of concave glasses.

2. When myopia, although persisting, notably diminishes with age, and is on the point of transforming itself into presbytia, it may happen at a certain period of life that the natural fatigue and the slow but progressive wear of the organ of vision render work with the naked eye painful and difficult. In these circumstances, feeble convex spectacles, or a single glass, may be accorded for a trial. Extreme care should be taken to ascertain if the patient finds an advantage in them,

and their continuance will not be permitted if there is any doubt on this point. Thus far experience has demonstrated to me the contrary; and I greatly doubt if others have obtained a different result from mine, when the patient had previously conformed in all points to the hygienic rules I have established for myopes. It would always be prudent and useful, when a patient experiences the need of convex glasses, to submit him for some time to the observance of these special rules, before according the spectacles he desires. Thus, he will be advised to allow the eyes to repose, to exercise them only on large distant objects, and to pursue a fortifying local treatment by spirituous liniments. We should not fail to examine, at the same time, if the asserted necessity of using convex glasses is not rather the symptom of an amblyopia produced by other causes than age and the depreciation which results from it. When the patient who recurs to convex glasses, obtains by them an amelioration, even though only apparent, it will almost always be discovered that he was not really affected with pure and simple congenital myopia, but that the affection was acquired myopia, or a certain degree of acquired or congenital presbytic amblyopia, or an incomplete return to presbytia produced by age, or, finally, some other unnoticed ocular affection simulating myopia.

3. Myopia well regulated may not only notably diminish with age, but even change to presbytia, especially when it was primitively of a feeble

degree and bordering on long-sightedness. The rules which are then applicable, are those of presbytia, and it will be convex glasses which he must employ. It is a case which rigorously does not belong to the category of this section.

The following observation will furnish a striking example of myopia changed to presbytia. I give it as written by the patient, himself a physician, aged 45 years. He had consulted me some months previously: I had been able to note all the characters of moderate presbytia, but those of the myopia having disappeared and being no longer appreciable, I thought that this myopia was probably acquired in early childhood, and that his primitive presbytia was restored in consequence of the progress of years, and of the wise precaution not to employ concave glasses except incidentally. It will be seen, on the contrary, from the lucid and precise details given (in December, 1846) by our estimable colleague, that it was truly a myopia changed to presbytia by the causes we have named, and that a new proof is furnished in support of what we have advanced in § XXIX. The myodopsia experienced for some years by the patient, has probably been caused by bringing objects too near during occupation, when presbytia had already commenced developing itself, and whilst our colleague believed himself still myope. Let Doctor B***t speak for himself.

"Please, I beg you, to recall to your memory a provincial colleague, whom you have twice had the kindness to oblige by advice; for his wife,

afflicted with amaurotic amblyopia, and for himself, affected with myodopsia. Please also to remember that you considered me as having always been presbytic, whilst I thought myself, on the contrary, to have been short-sighted from my youth. This difference of opinion having been a motive which induced you, sir, to request me to write a circumstantial history of my sight, I to-day discharge this obligation which I contracted with you. You will perhaps think that I do it tardily, but I offer in excuse the fear of fatiguing my sight, if I commenced any such employment, and the hope that by deferring I could announce to you that the musca had disappeared from my sight. In this respect my expectation has been deceived, for the spot I saw remains the same: I do not think it has augmented, but neither has it diminished. I am consoled by the fact that it does not trouble the distinctness of vision, it disappears entirely by artificial light, and, furthermore, I do not think that any serious consequences will ever result from it. However that may be, I pass to the information I promised you relative to the length of my sight.

"In my childhood, fixing my eyes upon the light of a candle, I sometimes saw it surrounded by a fog, or rather by a luminous areola; sometimes luminous rays united in bundles darted from it in different directions.

"Later, at the age of ten years, trying to distinguish the hour upon the face of the clock on the village church, I could distinguish it only with

difficulty and by winking,—a means which I have almost always been obliged to resort to when I looked at objects far off. At the same age, being a sacristan, I could only read, at the singing-desk of the choir, by approaching my eyes very near the book.

"Later yet, at the age of 24, when I studied medicine at Paris, it was almost impossible for me to read the epigraph bearing the name of the street where I was. Finally, I have always seen near objects with great clearness; far off, on the contrary, objects have always seemed to me foggy; a detached shadow accompanied them, which was repeated a second time when they were distant, so that instead of one body I saw three. Thus, being once in the Place Louis XV., the evening of an illumination, I saw three rows of lights upon the façade of the Church of the Madeleine, instead of the single range which actually existed.

"Finally, every time that hazard has led me to employ myopic spectacles, objects have presented themselves with the greatest distinctness (Nos. 16 and 24 appeared to me the best adapted.) Presbytic glasses, on the contrary, have never given any other result than to render things yet more indistinct, so that I could distinguish nothing.

"Within about a year, my sight has changed; presbytia begins to develop itself.

"For all the above reasons, I have always regarded myself myopic; nevertheless, sir, I refer the point to your judgment."

It is evident that this case was one of real and congenital myopia changed to presbytia; the myodopsia may be regarded as the precursory symptom of a presbytic amblyopia, with which the patient would soon have been afflicted if he had continued to regard himself as myope, and especially to bring objects as near as he had been in the habit of doing. I advised the observance of the following rules:

Abandon the use of concave glasses, even the most feeble, for seeing at a distance. Exercise the sight at a distance without spectacles. Whilst reading and writing, remove objects to the greatest possible distance, and interrupt work for a few instants, every three or four minutes, in order to look at a distance. Frequent fomentations upon the eyes with cold water, a little brandy being added to each glass. If these means do not suffice to cause the disappearance of the musca, and render assiduous occupation possible, employ, for reading and writing, convex colorless glasses No. 80, during the use of which, objects should also be placed at a distance, and which should be taken off every five or ten minutes, for some moments, in order to turn the unaided sight upon distant and voluminous objects.

4. Among those affections of the eye which may be taken for myopia, are opacities of the cornea, upon which we have already written. When they are recent and superficial, and occupy but a small space, it is not always easy to perceive them at first glance. The patient may experience an

irreparable injury, if, being naturally presbytic, he contracts the habit of bringing objects too near, and particularly if he uses concave glasses. He assumes during work the habits and the condition of myopes, and, being also capable of employing convex glasses with advantage, he may cause it to be thought that they are useful even in myopia.

5. We shall also name commencing cataract as an affection, which, taken for a certain degree of myopia, may mislead the judgment respecting the advantages of convex glasses in the latter affection. The sight becoming more indistinct, patients are generally constrained to bring objects nearer, which gives them the appearance of myopes to those about them, as well as to themselves. This resemblance, which is not real, becomes yet greater when the patient, notwithstanding a natural presbytia, has contracted the bad habit of bringing objects too near during occupation. In this case presbytia is easily confounded with myopia, since, at the moment when the crystalline begins to be opaque, the amelioration of vision by the aid of convex glasses, very perceptible in presbytic persons, is also evident, though more rarely and in a less degree, in those who are short-sighted; the convex glasses performing the office of magnifying lenses. If, then, a person affected with commencing cataract was wrongly regarded as myope, and convex glasses were accorded to him, they would not as a general rule injure his sight; but a false consequence would be deduced from the fact observed, which might be-

come injurious to other myopes who should ask advice, and whose crystalline had preserved its transparency. I came near drawing an erroneous conclusion of this kind, a few years since, in regard to an octogenary myope, who had all at once felt his sight weakened and ceased to be able to read fluently. Strong convex glasses (No. 24) restored the clearness of his vision, and, by bringing the book a little nearer, he could read even a small character without hesitation. For distant objects, he had long employed concave glasses No. 12, without which he distinguished nothing, and I consequently allowed him to continue their use. The change wrought in his vision remained entirely inexplicable to me as long as I merely continued to listen to the accounts of the patient, and to observe him read comparatively with and without spectacles. It was a phenomenon which I could not rationally explain to myself according to the laws of optics; for the patient was not in the least presbytic. I was on the point of concluding that presbytic spectacles might sometimes be useful to myopes advanced in age; but I had no sooner inspected the eye than I discovered the secret of the enigma. There existed an anterior cortical lenticular cataract, with numerous and irregular radii. This case furnished a new proof of the advantages of the method which we constantly recommend in our clinical lessons, and which appears to us the only one which is proper in medical practice: the anatomical characters of an affection, that is to say, all those which the

practitioner may discover by the evidence of his senses, should first of all be investigated. Only a secondary importance should be accorded to the oral examination, from which we seek to ascertain physiological characters and purely functional derangements. The same is true of the past history of a case, for which the physician is entirely at the mercy of the patient, whose true or false impressions are so deceptive, whose memory is so fleeting, and whose judgment is so subject to error.

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Overburdened with occupations and uncompleted works, and further, informed that a great many readers of the *Annales d'Oculistique*, have addressed letters to its editor to request the publication of our *Mémoire sur la carie de l'orbite*, we suspend, momentarily, the Lessons on Spectacles, in order to complete the above work, which has been for eight years nearly finished. Afterward we shall continue these Lessons, in which we have yet to treat of two very important points: 1st. *Alterations of the visual faculty depending on the inequality of range and of power in the two eyes, and the means of remedying them;* and, 2d, *The use of cataract glasses.*

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